



• WGN SCRAMBLING TESTS/ Failure?



• JAPAN'S BEST/ Panasonic C-2000



• NASHVILLE/ Here We Come!

THE TWICE PER MONTH BUSINESS JOURNAL OF TVRO

## COOP'S SATELLITE DIGEST



AUGUST 15, 1985



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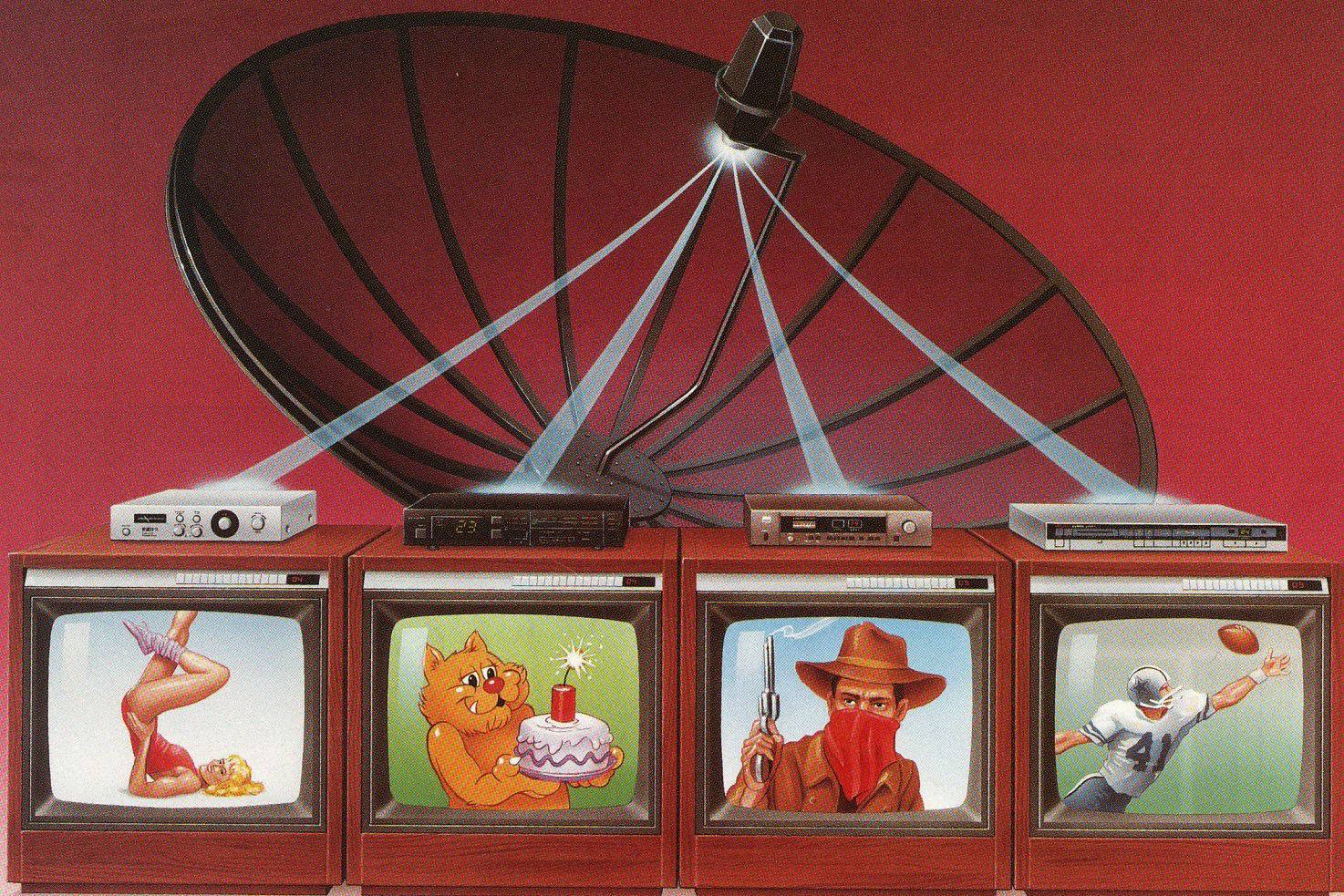
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AUGUST 15, 1985

**PREPARING For Nashville**

Yes, just two weeks away you and I and probably 12,000 or so others will be battling for standing space and food in the overtaxed facilities of Opryland Hotel. It seems like only yesterday we were in Tulsa and only weeks ago we were in Nashville the last time. My, how time flies when you are having fun!

**This year**, this show, **will be different**. The first signs of the 'great industry shake-out' were evident during last year's Nashville bash; not many of us recognized those signs. **Last year**, three fellows from **HBO** came to 'our show' and told us how they would make their scrambled programming available. Well, they didn't really tell us 'how'; more that they were 'thinking about' making it available. We reacted, if you will recall, with something between indignation and outrage. HBO's guys never did understand why; that's part of the reason they quietly folded up their tent and got out of the home TVRO marketing scenario this past April. **They never did understand us.**

Last year CSD sponsored our industry's Fifth Birthday Party; a two-hour event which I am still paying for. There won't be a sixth birthday party this year; not just because of the expense, but more because you can't do an event like that every year and hold people's attention. Maybe for our 10th.

Last year a relatively unknown antenna firm calling itself **Raydx** came on the scene; ten months later at Tulsa there would be 28 antenna 'clones' of their product on display, each bearing a different brand name. The antenna battles, for share of market, have boiled down to **Paraclipse** versus **Raydx** with several dozen hungry firms in third place. In Nashville this year we'll see new designs from both **Paraclipse** and **Raydx** and if you thought the marketing battle between the two was serious up to now, well . . . you ain't seen nothing yet!

**Last year** an established **SMATV** receiver manufacturer called **DX** displayed a new consumer receiver.

Almost everyone was surprised with how well it worked, its features, and its price. From a very weak 'oh yes, and then there is **DX**' listing to a strong number three or four, **DX** has blossomed into one of the more significant 'electronic success stories' of 1985. This year, as we noted in our **August 01** issue of **CSD**, **DX** is following up an aggressive receiver design with an aggressive marketing program designed to bring new consumers into **DX** retailer shops. Just as other receiver manufacturers scrambled to build receivers which followed the **DX** lead, so too will many of the same manufacturers be scrambling in Nashville this year to match the **DX marketing** program.

**Scrambling?** A fair choice of words. If we thought we were confused by scrambling of satellite feeds last year, very few could have foreseen the almost hopeless situation we face this year in Nashville. The fellow or firm that can resolve the scrambling war with cable and cable programmers can retire for life on the proceeds for his brilliance. It is said that every bad situation creates at least one new, good, situation. Like making lemonade from a lemon. In Nashville this year we will hear at least one attempt to make lemonade out of the scrambling lemon. What might that be? Perhaps, just perhaps, it will be a brand new programming service fed by satellite and designed from the start to be a 'direct-to-home' service **just for home TVRO viewers**; and they will promise '**Never To Scramble**'.

Nashville will tax your every fiber and your every ounce of self control; from the 24 hour set-up time allocated to create all of those exhibits to the badly overstuffed exhibit, eating and sleeping areas . . . when you finally head home on September 4th or 5th, you will know you have been to the greatest, grandest, and most confusing **TVRO** trade show in our six-year history. Good luck; **you will need it!**

**COOP'S  
SATELLITE  
DIGEST  
/ 2**



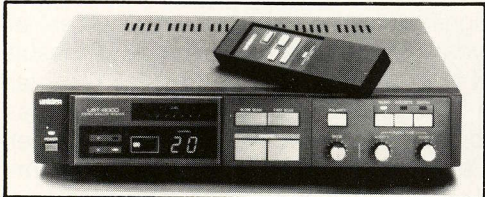
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**UST 5000** Block receiver offers LED channel display, automatic polarity control, slow and fast scan.



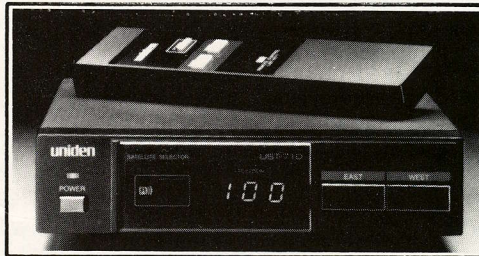
**UST 6000** Block receiver features expanded audio format and fine tuning skew adjustments.



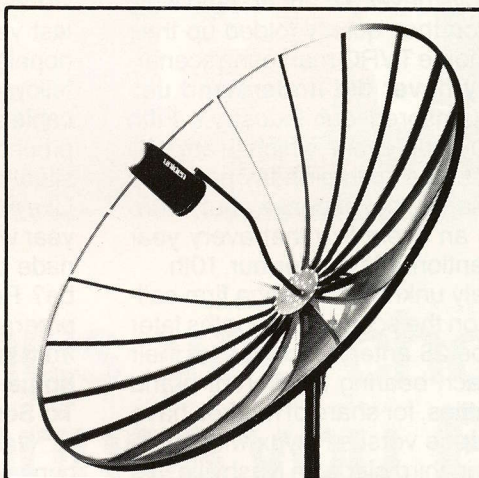
**UST 7000** Block receiver features IR remote built-in programmable antenna control accommodating up to 81 satellite positions in memory.



**UST 730** Antenna Positioner features built-in programmable antenna control and Opto-Interrupt circuitry.



**UST 710** Antenna positioner offers compact styling, manual east west control and 3 digit LED readout.



**UST 110** Aluminum Mesh Antenna is designed for maximum flexibility and maintenance, easy to install and weather resistant.



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## SCRAMBLING NEWS Updates:

**Channel Master Corporation** (Smithville, NC) has become the first TVRO receiver manufacturer to agree to purchase the **M/A-Com Videocipher** descrambler package. Until this point, no receiver OEM nor distributor had agreed to order the VC2000E units for resale through TVRO distribution channels to consumers. The agreement covers purchase of the 'E' series (stand alone) units and the creation of a new CM home style receiver with the M/A-Com 'IRD' (built-in descrambler) capability. M/A-Com expects to begin delivery of the VC2000E units to Channel Master 'late in 1985.' Channel Master's TVRO market share is variously estimated in the 5% region.



M/A-Com's Bothwell, Dunham (left) and CM's Derrenbacher and Deutsch (right) with CM 'branded' VC2000E (table in front).

**Anixter Communications, Inc.**, a major distributor of cable television electronics and construction hardware through a national network of warehouses, has agreed to purchase \$2.5M in **cable-grade VC2C descramblers** for resale to cable, SMATV and MDS licensees. The cable grade descramblers are being stocked by Anixter in anticipation of increased cable system demand for the product as additional cable programmers announce their plans to scramble satellite feeds. M/A-Com is estimated to be approximately 10-12,000 VC2 units 'ahead' in production, over demand, at the present time, gearing up for installations planned by Showtime, The Movie Channel and perhaps other satellite programmers.

**Scientific-Atlanta, Inc.** is opening a service center in Sydney, Australia to support its 'exclusive contract' to provide the new Australian Aussat (11 GHz) satellite system with encoding using the **B-Mac encryption** system created in the United Kingdom. The B-Mac system employs time rather than frequency multiplexing techniques, offers up to six audio channels, a 9.6K data channel and a high speed teletext channel. Each receiver is addressable in the system.

**SPACE** has urged TVRO dealers and consumers to 'ignore' the announcements coming from **CNN/CNN-2** and **ESPN** requesting that viewers send in annual payments for continued 'legal viewing' of unscrambled signals. SPACE maintains that while Turner and ESPN are free to 'announce' their plans to charge a fee, the fees themselves cannot be arrived at 'unilaterally' and that the legislation adopted in November of 1984 covering scrambling requires 'marketplace negotiations' between programmers and users **before** a fixed price can be charged.

## SYSTEM News

**Anderson Scientific, Inc.** (2693 Commerce Rd., Rapid City, SD 57702; 605/341-3781) has announced a six foot '**Microvision 6'** system which combines all of the elements required for a complete system into a single installation package. Included is the ST1010 receiver, LNA, downconverter, 6' dish, polar mount, polarmatic feedhorn, cables and a set of instructions. The full system is covered by an Anderson factory warranty, is UPS shipping capable and with

NEW  
PRODUCTS/  
SERVICES/  
EVENTS



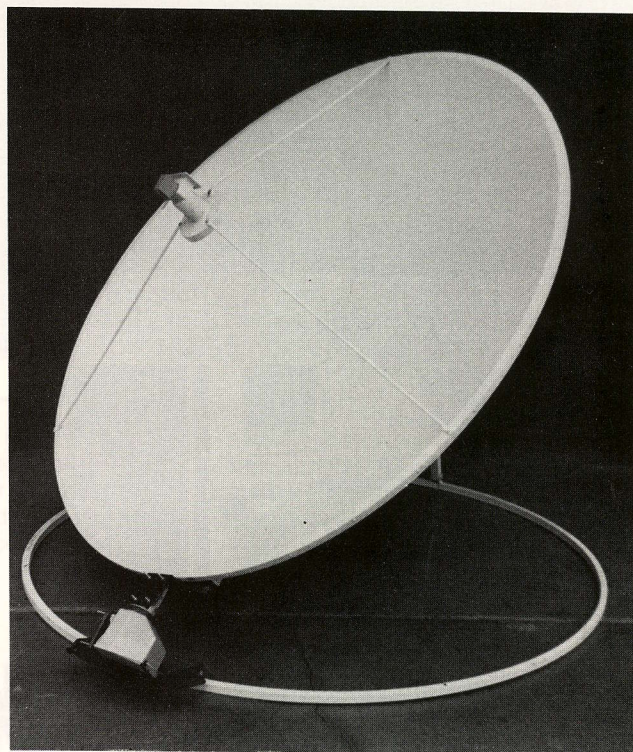
GE's One Remote



SITEMAN Searcher

the BDC technology can be expanded to multiple receivers using the same (shared) dish.

**Echosphere Corporation** (1925 West Dartmouth Ave., Englewood, Co. 80110; 303/761-4782 for headquarters; outlets in Tn, Tx, Ca and Arizona as well) has introduced **EchoStar**,<sup>®</sup> an under \$1,000 (retail price) package created to help dealers penetrate the bottom end of the marketplace. The system has been designed for quick and easy installation, lending itself to semi-permanent residents of apartments for example. The system includes a six foot dish with ring mount (polar mount available as extra), tripod-feed support system with polarization rotation, a receiver, LNA and 10 foot pigtail of LNA to downconverter cable.



## ECHOSTAR<sup>®</sup> Headed for Low End

**Houssen Tech, Inc.** (P.O. Box 2126, Moncton, New Brunswick, Canada E1C 8H7; 506/534-2530) will be showing a **\$699** retail priced package in Nashville. The system includes a 4.5 foot Mark Two antenna (two or one piece design), feed, mount, a block conversion receiver with a 70 degree LNA.

**Scientific-Atlanta, Inc.** (One Technology Parkway, P.O. Box 105600, Atlanta, Georgia 30348; 404/441-4000) has released technical details for their much anticipated **Homesat**<sup>®</sup> system. Scientific-Atlanta pioneered home TVRO in 1979 with the **first** OEM packaged

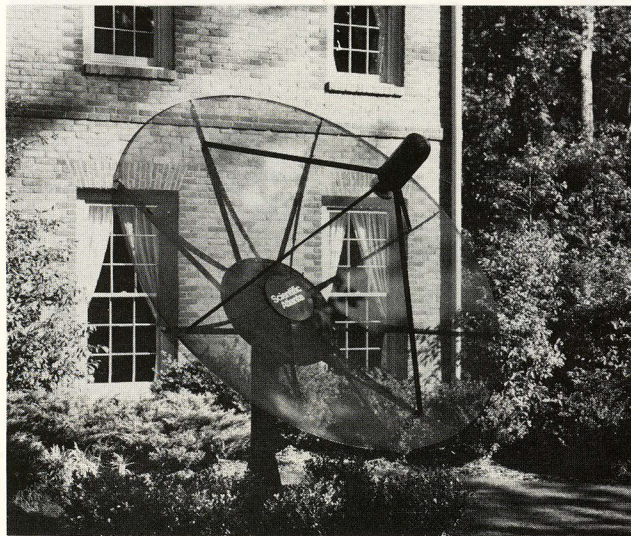


systems offered to home consumers. The systems were removed from the marketplace late in 1979 after program permission problems with HBO (and others) surfaced. The new S-A systems include a pair of antennas (model 8000 perforated and model 9000 solid; both 2.8 meters in diameter), and the model 800 block downconversion receiver with accessories. Antennas use galvanized reflector panels with baked-on enamel finishes; horizon to horizon tracking is available, optionally. The 800 receiver is microprocessor controlled with the standard 950-1450 MHz (block) IF, including a built-in antenna positioner, discrete and matrix stereo outputs, dynamic noise reduction and an IR remote. They say it is descrambler compatible as well with an 80 degree LNB standard.

Homesat systems will sell through **authorized dealers** rather than through distributors, with suggested retail pricing of under \$2500. S-A will maintain regional distribution centers where dealers will be trained and factory repairs will be available.



SA 800 series receiver/ Direct to dealers



SA 8000 series mesh antenna; horizon to horizon

S-A recently installed a private cable system for the Jimmy Connors' Tennis Resort near Fort Myers (Fl), and, a total of 53 off-shore oil rig installations using the series 9000 Homesat antenna systems.

Installing dealer for the oil rig systems was Auto-Comm Engineering of Lafayette, La.

#### DISTRIBUTOR Doings

**Echosphere-Arizona** is the newest Echosphere operated distribution center. The **Phoenix** center, integrating a facility operated previously by Westek, joins other Echosphere centers in Sacramento, Dallas, Knoxville and the original outlet in Denver. Dealers served by the Phoenix facility will have access to the full range of Echosphere dealer assistance including training seminars.

**Misat Satellite Corporation** (2000 Barnes Street, Penticon, BC V2A 4C3; 604/493-7168, or 604/534-4104 in Langley, BC) has been appointed as the regional distributor for the **General Instrument** line of TVRO products. They are now stocking GI and Jerrold TVRO system parts including the provision of fully pre-wired and tested SMATV headends.

**Satellite Video Services** (RR #1, Box 85-S, Paul Saxe Road, Catskill, NY 12414; 518/678-9581 with additional offices in Hornell, NY, Raymond, NH and Altoona, Pa) is now handling the complete line-up of **Pentec MTI** antenna positioners. The MTI units, coupled with 18" Hammerblow drives, are backed by the service facilities of SVS at each of its locations.

**Satellite Reception Systems** (145 N. Columbus Road, Athens, Ohio 45701; 800/592-1956 national and 800/592-1957 in Ohio) has added the **M/A-Com** line of TVRO products and the **STS LSR** satellite receiver/controller. **Tom Brooks** of SRS recently completed an STS training school for the LSR receiver in preparation for handling warranty repair for the STS equipment. STS has also completed reorganizing its internal top management structure, setting up five vice presidential spots; for R&D (**Tom Zehr**), Merchandising (**Bob Virden**), Finance (**Chip Debus**), Operations (**Stephen Messina**) and Executive (**Connie Willett-Everett**). In a new dealer recognition program, SRS will begin naming a 'Dealer Of The Month' from its universe of some 4,000 dealers.

#### ANTENNA Amblings

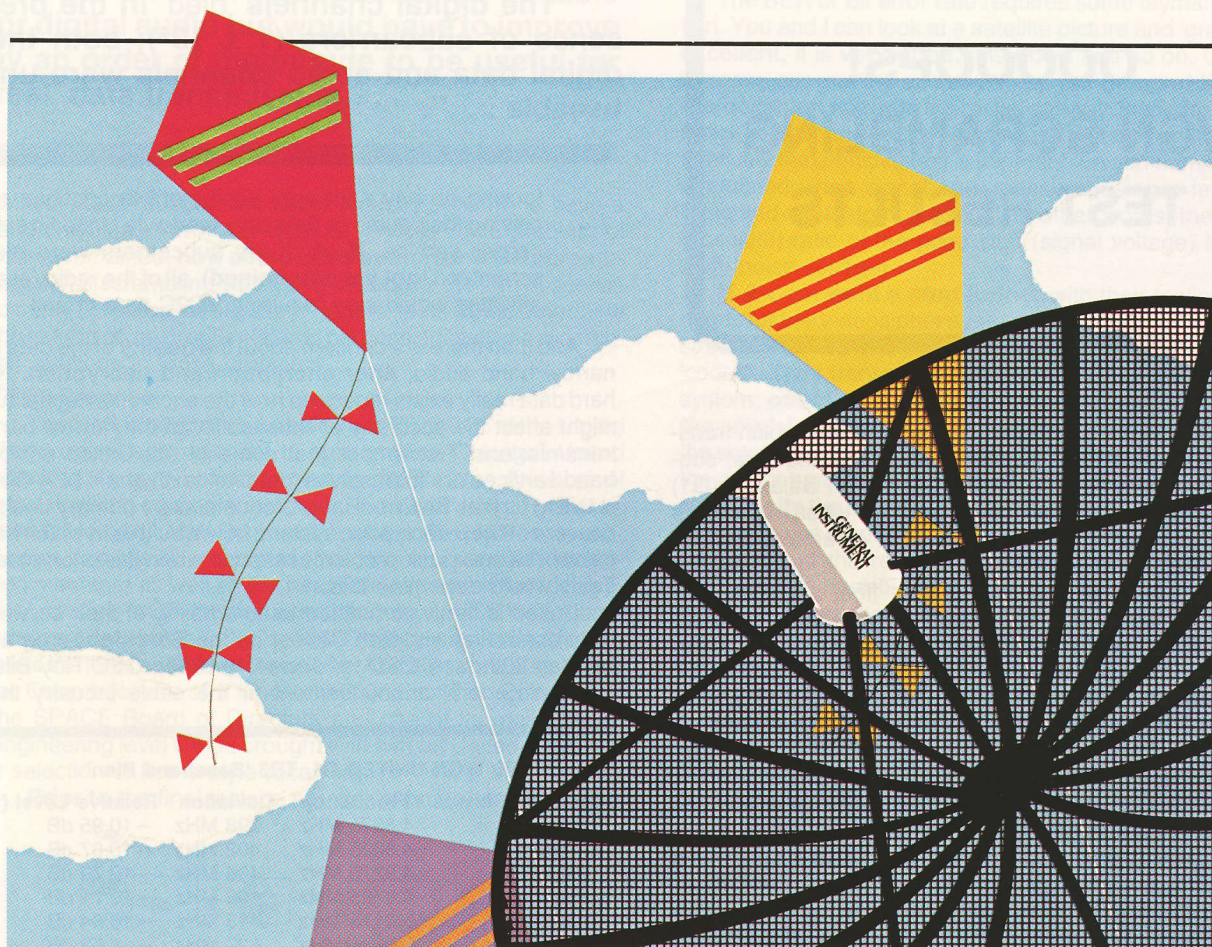
**Aztech Antenna Corporation** (Box 21, Route 150, West Sand Lake, New York 12196; 800/892-8999 nationally or 518/674-2864 within New York) has announced a **five-foot** spun aluminum antenna called 'Wolverine.' The antenna is designed for single (such as Galaxy) satellite applications and features a non-rusting (PVC) mount. Claimed gain is 34 dB and the f/D of the antenna is .375. The



WOLVERINE squats for Galaxy prey



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**SYSTEM 950...** Block downconversion technology in an attractively styled low cost package.



## OOOOOPS! WGN SCRAMBLING TEST RESULTS

### TESTING Sequence

United Video, the common carrier company which transmits WGN and a host of narrow-band (audio and data) sub-carrier services throughout North America on Galaxy 1 (G1) transponder 3 (TR3) has a 'special problem' when it considers the transfer from an unscrambled to a scrambled service format. That problem?

United has 25 (!/ you read it here first) separate sub-carriers in operation or scheduled for operation between 4.8375 MHz and 8.1450 MHz (see **table one** here). No other transponder even comes close to this 'loading factor' and the presence of so many non-video-sub-carriers poses special problems to their adoption of and adaptation to a scrambling system.

It is a multi-pointed problem or set of problems:

- A) All of those sub-carriers require spectrum space and the spectrum space may (or may not) fall in a frequency segment which the Videocipher planners did not consider 'useful' for the transmission of data or information. In other words, **perhaps** the Videocipher system **never took into consideration** the possibility that a narrow band data or audio channel might someday reside at a point 4.8375 MHz above the video carrier center frequency. And perhaps the presence of such a sub-carrier **could cause** degradation to the Videocipher processing of the primary (video) carrier.
- B) Or, the reverse might be true; perhaps in planning the Videocipher system, all of that 'digital electronics' was planned without regard to how it might interfere with data and audio sub-carriers laced between the nominal 4.500 MHz upper frequency cut-off of the video information and the nominal 8.500 MHz 'top end' of the useful baseband 'passband'.

There are other considerations, **unique to United**. They have far more receive terminals using their service than any other transponder in service. When you take the 1,000 plus radio network affiliates for the Satellite Music Network (as one larger example) and add them to the number of CATV and SMATV 'affiliates' for main-channel service WGN, the marketplace for M/A-Com Videocipher II (cable style) descramblers becomes very large indeed.

- C) While the cable industry **seems to be** telling the software providers such as United, "If necessary, we (cable TV) **will pay for the cost of our own VC2 units**," United could face a larger problem with their **non-TV** affiliates who may have special problems with

### From United Report:

"The digital channels 'died' in the presence of subcarriers ( $1 \times 10^{-2}$ ); both the digital data and audio channels were un-useable . . .".

tacking on any additional equipment to continue receiving their audio or data only feeds via United's sub-carrier service. If all of the subcarriers were also scrambled (**not yet determined**), all of the radio (et al) affiliates would also require a VC2C type of unit.

And then there is a concern about the **quality** of the data or narrow band audio, **after encryption and decryption**. No hard data really exists regarding how the encryption technique might affect the accuracy or reuseability of the narrow band transmissions. Remember that some of the United narrow band services are themselves 'data' or 'text'; and if M/A-Com is telling us that 'Bit Error Rates', for data, are a primary design concern of **their** decryption system, how would data which has its own 'bit error rate' problems respond when it is encrypted? Tests would determine this.

United is firmly committed to scrambling of their service. After appearing with Bob Cooper on the **Boresight** program for May 30th (see **CSD** for **June 01, 1985**), CEO Roy Bliss made a general announcement to the cable industry that

TABLE ONE/ WGN-UNITED G1, TR3 'Baseband Plan'

Subcarrier Service	Frequency	Deviation	Relative Level (*)
NMC	4.8375 MHz	.398 MHz	-10.95 dB
GOES 1	4.8825 MHz	.402 MHz	-10.87 dB
GOES 2	4.9275 MHz	.406 MHz	-10.79 dB
(Spare)	4.9725 MHz	.409 MHz	-10.71 dB
Data Cable	5.0175 MHz	.413 MHz	-10.64 dB
EPG 'Jr.'	5.0850 MHz	.527 MHz	- 8.53 dB
Zephyr (Mux)	5.1750 MHz	.536 MHz	- 8.38 dB
NAFAX	5.2425 MHz	.431 MHz	-10.27 dB
DIFAX	5.2875 MHz	.435 MHz	-10.19 dB
MBI/Left	5.4000 MHz	.772 MHz	- 5.22 dB
SMN(1)/Left	5.5800 MHz	.798 MHz	- 4.94 dB
SMN(1)/Right	5.7600 MHz	.824 MHz	- 4.67 dB
SMN(2)/Left	5.9400 MHz	.849 MHz	- 4.41 dB
SMN(2)/Right	6.1200 MHz	.875 MHz	- 4.15 dB
WFMT/Left	6.3000 MHz	.718 MHz	- 5.86 dB
WFMT/Right	6.4800 MHz	.739 MHz	- 5.64 dB
<b>WGN AUDIO</b>	<b>6.8000 MHz</b>	<b>1.414 MHz</b>	<b>0.00 dB (*)</b>
EPG	7.2377 MHz	.941 MHz	- 3.55 dB
SMN(3)/Left	7.3800 MHz	1.055 MHz	- 2.55 dB
SMN(3)/Right	7.5600 MHz	1.081 MHz	- 2.35 dB
SEEBURG (1)	7.6950 MHz	.797 MHz	- 4.99 dB
UPI (Mux)	7.7850 MHz	.807 MHz	- 4.90 dB
MBI/Right	7.9200 MHz	1.133 MHz	- 1.95 dB
Sport Trak	8.0550 MHz	.834 MHz	- 4.60 dB
SEEBURG (2)	8.1450 MHz	.844 MHz	- 4.51 dB

\*/ All aural carrier readings are relative to the WGN 6.8000 aural subcarrier level, and it in turn is relative to the peak power for the WGN **video** carrier. A reading of - 4.99 dB (Seeburg-1) means the Seeburg carrier at 7.6950 MHz is transmitted **4.99 dB lower in level** than the WGN audio at **6.8000 MHz**. For reference, the WGN 6.8000 MHz audio is transmitted at an average level 18.73 dB below the WGN visual (handy for calibrating your spectrum analyzer!).



### From United Report:

"The bit error rate . . . may be suitable for digital audio but would have to improve by an order of magnitude to be useful for 'real' data transmission . . ."

United would 'support the cable industry's desire to have a total universe of firmly encrypted services'. The problem of course remained; **how could Bliss authorize WGN scrambling** if that scrambling was going to deprive the firm of service to many of its **non-cable** users? Again, tests would determine the extend of the problem(s) and perhaps point at some potential solutions to those problems.

### TEST Program

The testing program was held June 25 and 26 at the United Video uplink site adjacent to metropolitan Chicago. United operates its own uplink service for WGN plus the host of non-television related sub-carrier and narrow-band services (see table one). M/A-Com sent engineer **Randy Pike** to participate and assist, and provided an uplink scrambler (encryption machine) as well as the necessary descrambler (decryption) unit(s); VC2 family and a prototype VC2000E home service descrambler. CSD's Bob Cooper was invited to **witness** the tests and **Doug Dehnert** of **USS/Maspro** substituted for Coop because of a time scheduling conflict. Dehnert, on the SPACE Board of Directors and one of its most 'savvy' engineering level CEOs brought with him (at United invitation) a selection of home-style receivers.

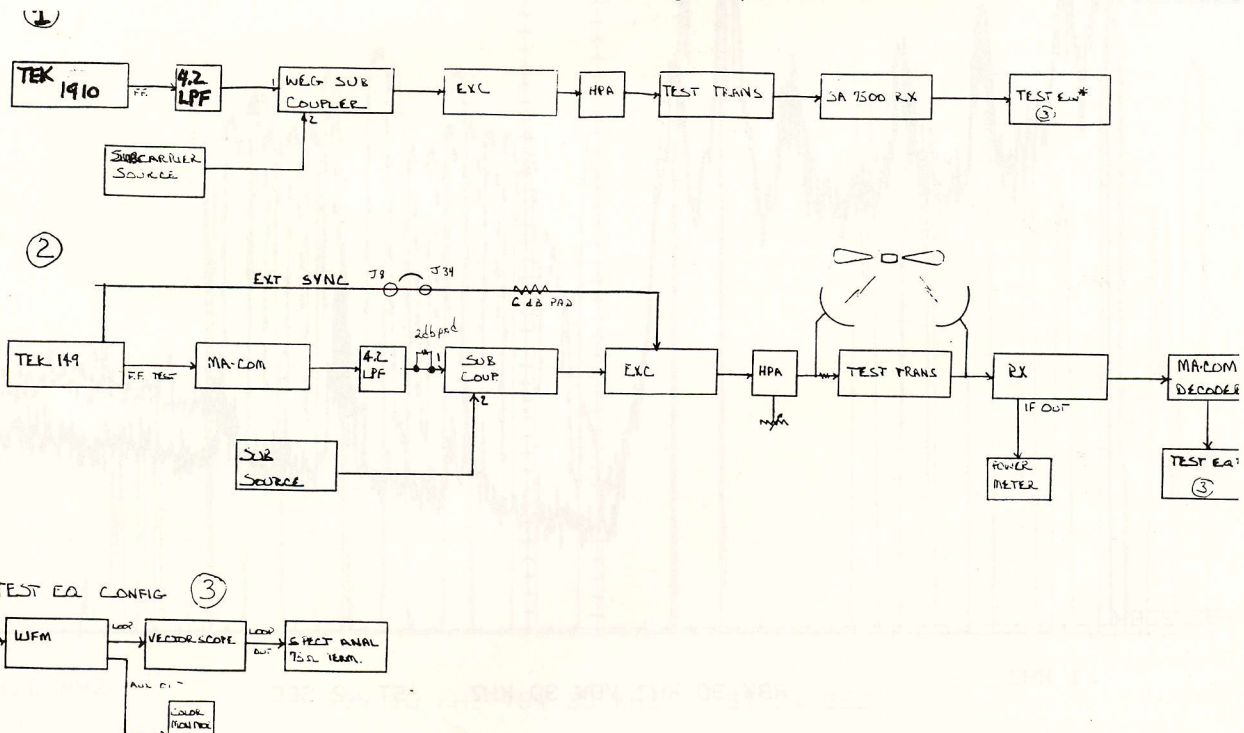
Prior to the final tests, a number of home-style receivers

had been tested using the M/A-Com 'preferred' bit-error-rate (BER) technique. The results of those additional tests are shown here in **table two**.

The BER or bit error rate requires some layman explanation. You and I can look at a satellite picture and 'grade' it; it is **excellent**, it is **very good**, it is **good** and so on. Or we can increase our grading and say 'there are **no sparklies**', there are '**occasion sparklie hits**' or we can say 'there are **constant sparklie hits**' and so on. We can take that a step further; using relatively inexpensive test equipment we can sample the demodulated video signal and 'measure' using a test set the 'weighted signal-to-noise ratio'; in other words, the apparent (absolute) ratio of the good stuff (signal voltage) to the bad stuff (noise voltage).

**M/A-Com went a step further** with their testing requirements for the Videocipher system. They create a (digital) data stream; a series or sequence of electronic pulses which are 'coded'. They transmit this series of pulses through the full system; **out of the baseband system at the uplink, through the uplink transmitter, 24,000 or more miles through space to the satellite, into the satellite in the 6 GHz band, translated to the 4 GHz band and then retransmitted down to earth. At the receive site** the signal is captured by the antenna, is amplified by a low noise amplifier, converted by a low noise converter, is processed at the receiver's IF (intermediate frequency), is demodulated from IF to baseband, is further processed and amplified at baseband and then that original data or impulse stream is compared **data-pulse for data-pulse** with the original signal sent to the uplink at baseband.

Each pulse is a 'bit' in lay terms and the measurement system counts the number of times (per second, minute, hour; whatever time reference base as was selected) that the received data stream does not 'check' or 'compare' directly with the original uplink-sent baseband data. **Each time** there is **no**



UNITED VIDEO and M/A-Com Test Configuration (sketch courtesy of United Video Engineering Department and Michael T. Peyton, Vice President of Operations).



**comparison** (i.e. the data does not match) we have a 'bit error'. The number of such errors within the specified time frame (typically one second) is a 'bit error rate' or BER.

The higher the BER, the greater the likelihood that the received information will 'garbage'; that is, not be the same as sent. Different types of data or information have different tolerance levels for bit error rates; **video**, being a largely redundant service where separate lines on the screen, fairly close together usually contain essentially the same 'information', is one of the more tolerant 'modulation techniques' when it comes to bit error rates. Moderately high speed data, on the other hand, is not so tolerant. If the data stream was sending 9,600 separate bits of information per second, and every second had an entirely new set of data (from the preceding and following seconds), a bit error rate that would go unnoticed in a television transmission could cause the data stream to lose whole words, whole sentences, or at 9,600 bits per second, even whole pages of data!

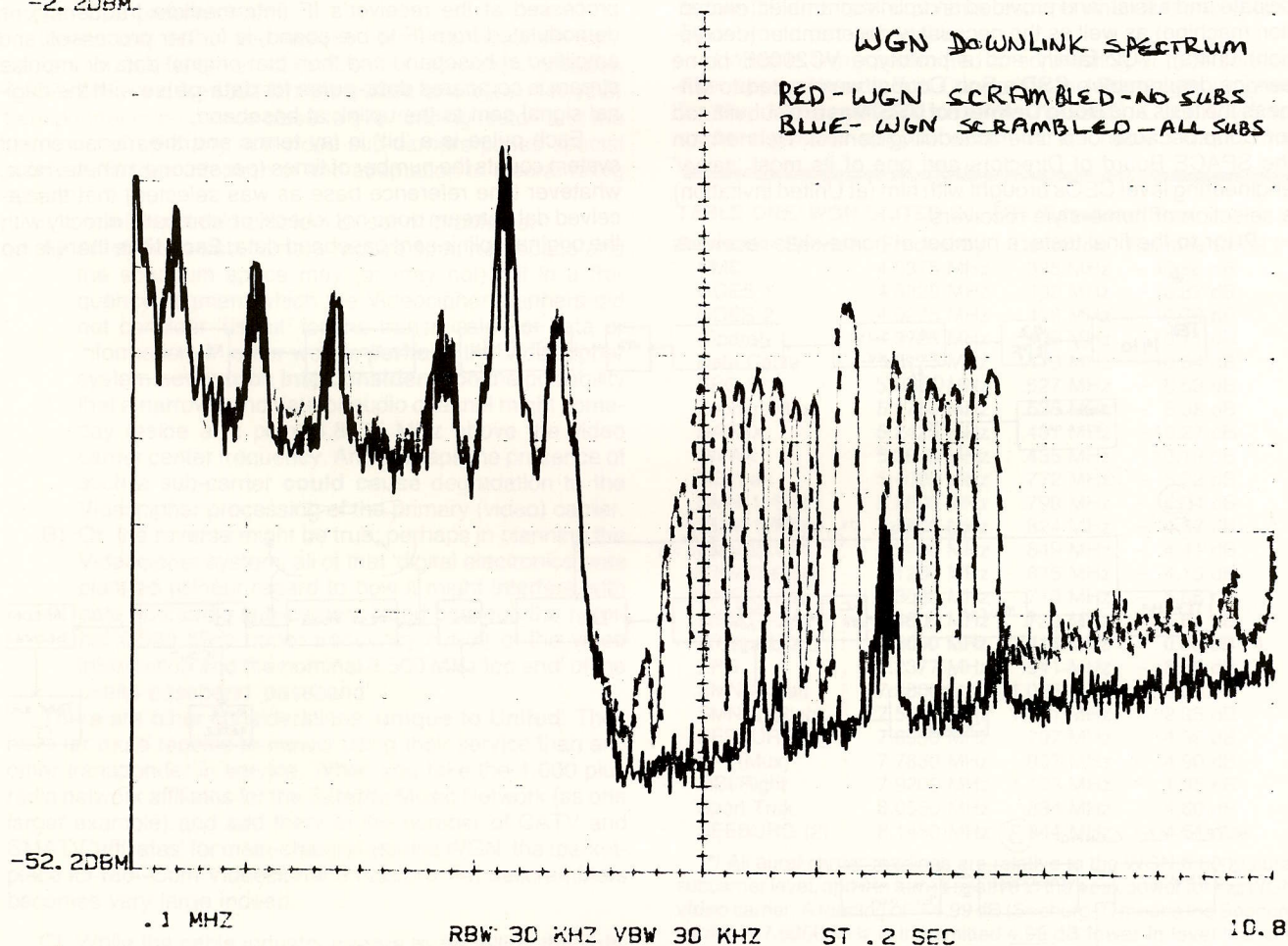
**M/A-Com**, as we learned in **CSD** for May 01, May 15 and June 01, is **very interested** in the ability of their scrambling package to handle 'high speed data transmission' at low BERs. They tell us that this is **because** in the process of addressing each **individual** decoder, the high speed data

-2.2DBM.

#### WGN/UNITED TR3 PARAMETERS:

- 1) Deviation of main carrier by energy dispersal and subcarriers: **3.952053 MHz**
  - 2) Video Deviation: **8.600001 MHz**
  - 3) Occupied Bandwidth: **35.21922 MHz**
  - 4) Reference: Video deviation as function of occupied bandwidth/
- | Deviation    | Bandwidth |
|--------------|-----------|
| 5.601097 MHz | 30 MHz    |
| 6.203007 MHz | 31 MHz    |
| 6.788393 MHz | 32 MHz    |
| 7.361202 MHz | 33 MHz    |
| 7.924158 MHz | 34 MHz    |
| 8.479227 MHz | 35 MHz    |
| 9.027861 MHz | 36 MHz    |

stream will only spit out or include that particular decoder's 'address' and 'decoding instructions' every-so-often. Some number crunchers have shown us that with a decoder universe of say 5,000,000 homes, each decoder would be 're-visited' with its own address no more often than once every two days. Therefore, M/A-Com tells, the BER must be **low** at the receive system to insure that **when** that addressing mes-



**WGN DOWNLINK SPECTRUM/** heavy black is WGN scrambled with no subcarriers while lighter grey (dashed line) is WGN scrambled with all subcarriers present. Left hand of chart is 0.1 MHz and right hand is chart is 10.8 MHz. Chart courtesy of United Video.



sage pops down the line for that **individual** descrambler/decoder, the receiver receives and processes those instructions without flaws.

A system that includes many sub-carriers, such as United's system, has to be doubly careful that in the process of transmitting its own main video carrier and its 25 narrow band carriers, it does not create additional 'ghost' or 'error' signals with the system, adding to the bit error rate of those decoders plugged into the system.

**This final explanatory note on BER.** They are measured and recited in reports in a numerical or mathematical way. This provides the analyst with a **real set of numbers** so that two specific pieces of equipment can be directly compared for performance. As table two shows here, the numbers change as the original carrier to noise ratio changes; **more signal** (i.e. carrier) provides **improved** descrambler performance. At first cut, you might think that bigger numbers mean more errors and in a sense this is true in the real world. **However**, bit error rate is arrived at by a comparison formula and **for now accept** that bigger numbers mean fewer errors. Even given

### From United Report:

**"The performance of the digital channel with subcarriers was significantly worse . . ."**

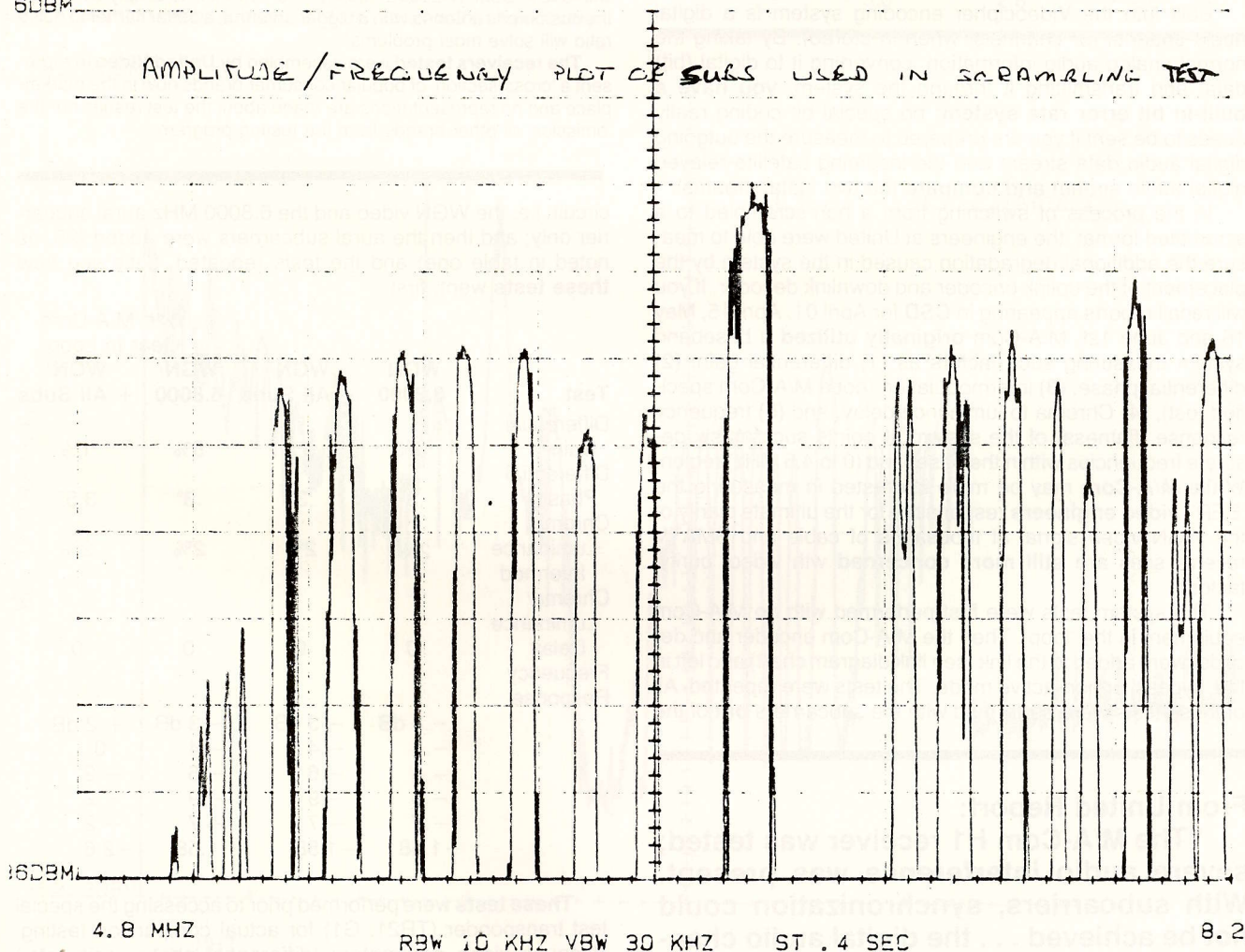
that statement, table two may still be confusing to you. 'Powers' is the answer.

#### Some examples.

$4 \times 10^{-3}$  typically means you are after the number which equals multiplying the single digit '4' with the number 10 raised to its third power. Power? 10 is 10, but  $10 \times$  (times) 10 is 100 and  $10 \times 10 \times 10$  is 1,000. So  $4 \times 10^{-3}$  normally means  $4 \times 1,000$  or 4,000. **That number** appears here as the performance of the (M/A-Com) T-1 receiver at a carrier to noise ratio of 6 dB (really too low to produce a sparklie-free picture). Now in table two look to the right and we see that at a carrier to noise ratio of 9 dB, the same receiver produced a 'BER' of  $2 \times 10^{-5}$ . In our

60dBm

AMPLITUDE / FREQUENCY PLOT OF SUBS USED IN SCRAMBLING TEST



**WGN DOWNLINK SPECTRUM/** showing only portion from 4.8000 MHz to 8.2000 MHz; compare carriers shown (amplitude or vertical display) against table-one data which lists all 25 subcarriers. Chart courtesy of United Video.



**example**, that compares to 2 x 10,000 or 20,000; certainly more than our original 4,000. (**Note:** Purists in the crowd will find fault with this **simplified explanation** and we accept that criticism **before** we hear it!).

This observation about table two; by the time we get to relatively 'fat' carrier to noise ratios (12 dB) there was no measureable degradation difference between the various receivers. The original table two material, extracted from data compiled by M/A-Com, listed the receivers in alphabetical order. We have rearranged that sequence so that the best performing receivers are at the top of the table two list and those that performed less well (at the critical 6 dB carrier to noise point) are further down the list. **This set** of receiver test results has **not been released** by M/A-Com, incidentally, and our source for this information will not be identified.

#### TEST PROCEDURES

The United Video testing sequence involved first measuring their own video (and data/audio) operating parameters **before** the scrambler was placed in the 'loop' at the uplink, and **before** a descrambler was placed in the loop at the downlink. Both were physically together with a 10 meter Andrew and a 5 meter Paracclipse antenna used for the receiving tests.

Built into the Videocipher encoding system is a digital audio channel (or channels, when in stereo). By taking the normal analog audio information, converting it to digital (bit) data, and transmitting it through the system, **you have a built-in bit error rate system**; no special bit coding really needs to be sent if you are prepared to measure the outgoing digital audio data stream and the incoming satellite-relayed digital audio stream **and compare** the two 'data streams'.

In the process of switching from a non-scrambled to a scrambled format, the engineers at United were able to measure the additional degradation caused in the system by the placement of the uplink encoder and downlink decoder. If you will recall reports appearing in **CSD** for April 01, April 15, May 15 and June 1st, M/A-Com **originally utilized** a baseband system measuring such factors as (1) differential gain, (2) differential phase, (3) intermodulation (not a M/A-Com specified test), (4) Chroma to luminance delay, and (5) frequency response (flatness) of the system at points such as six discrete frequencies within the baseband (0 to 4.5 MHz) region. **While M/A-Com** may be more interested in measuring the 'BER', **video engineers** responsible for the ultimate clarity of the WGN video signal at thousands of cable and SMATV receive sites **are still more concerned** with video 'purity' factors.

The system tests were first performed with no M/A-Com equipment in the 'loop'. Then the M/A-Com encoder and decoder were added to the link (see link diagram chart) and left in the 'bypass' or non-active mode. The tests were repeated. All of these tests were performed with the subcarriers **out** of the

#### From United Report:

**"The M/A-Com H1 receiver was tested; severe audio interference was present. With subcarriers, synchronization could not be achieved . . . the digital audio channel was completely interrupted, at a carrier to noise ratio of 10 dB . . ."**

**TABLE TWO/ BIT ERROR RATE of selected TVRO receivers:**

M/A-Com has done testing on a randomly selected group of 'consumer style' receivers as a part of the WGN analysis program. These results detail the measured bit-error-rates (BER) for the receivers tested. This data **has not been** released by M/A-Com nor United Video and the source is not identified.

Receiver Model	C/N = 6 dB	C/N = 9 dB	C/N = 12 dB
USS Maspro SRA500	$7.3 \times 10^{-3}$	no test	no test
Boman SR-2500	$5.5 \times 10^{-3}$	$8 \times 10^{-5}$	$1 \times 10^{-6}$ (*)
Gillaspie 8300	$5.5 \times 10^{-3}$	$5 \times 10^{-5}$	$1 \times 10^{-6}$ (*)
Wilson YM400	$5.0 \times 10^{-3}$	$4 \times 10^{-5}$	$1 \times 10^{-6}$ (*)
Uniden UST5000	$4.6 \times 10^{-3}$	$3.5 \times 10^{-5}$	$1 \times 10^{-6}$ (*)
Winegard RF1000	$4.5 \times 10^{-3}$	$4 \times 10^{-5}$	$1 \times 10^{-6}$ (*)
McCullough USA-1	$4.3 \times 10^{-3}$	$3.6 \times 10^{-5}$	$1 \times 10^{-6}$ (*)
M/A-Com T1	$4.0 \times 10^{-3}$	$2.0 \times 10^{-5}$	$1 \times 10^{-6}$ (*)
Uniden UST6000	$3.5 \times 10^{-3}$	$3.0 \times 10^{-5}$	$1 \times 10^{-6}$ (*)
Uniden UST7000	$3.5 \times 10^{-3}$	$3.0 \times 10^{-5}$	$1 \times 10^{-6}$ (*)
Boman SR-1500	$3.5 \times 10^{-3}$	$3.6 \times 10^{-5}$	$1 \times 10^{-6}$ (*)
Wilson YM1000	$3.0 \times 10^{-3}$	$2.5 \times 10^{-5}$	$1 \times 10^{-6}$ (*)

\*/ Tests conducted at high carrier to noise ratio (12 dB) were **all** 'better than' or '**less than**'  $1 \times 10^{-6}$  indicating that in any marginal situation, the 'ultimate solution' to making an existing system 'play' with a M/A-Com VC2000E descrambler retrofit is to simply exchange the customer's antenna with a bigger antenna; a better carrier to noise ratio will solve most problems!

**The receivers tested** were assembled by **United Video** to represent a 'cross-section' of popular consumer brands now in the marketplace and no representations are made about the test results nor the 'omission' of other brands from the testing program.

circuit; i.e. the WGN video and the 6.8000 MHz aural subcarrier only; and then the aural subcarriers were added (25, as noted in table one) and the tests repeated. Let's see how **these tests** went, first:

Test	With M/A-Com Gear In Loop			
	WGN/ 6.8000	WGN/ + All Subs	WGN/ 6.8000	WGN/ + All Subs
Differential Gain	5%	5%	5%	1%
Differential Phase	.3°	.3°	.3°	3.5°
Chroma/ Luminance Intermod	2%	2%	2%	2%
Chroma/ Luminance Delay	0	0	0	0
Frequency Response	-.3 dB	-.3 dB	-.3 dB	+.2 dB
	-.4	-.4	-.4	0
	-.6	-.6	-.6	-.2
	-.9	-.9	-.9	-.2
	-.7	-.7	-.7	-.2
	-1.58	-1.58	-1.58	-2.6

**These tests** were performed prior to accessing the special test transponder (TR21, G1) for actual comparison testing. Because video parameters (differential phase, gain, etc.) **change** in small increments **over time**, the entire system must be redefined prior to actual through-satellite testing with the operating M/A-Com encoder and decoders. Thus we have a



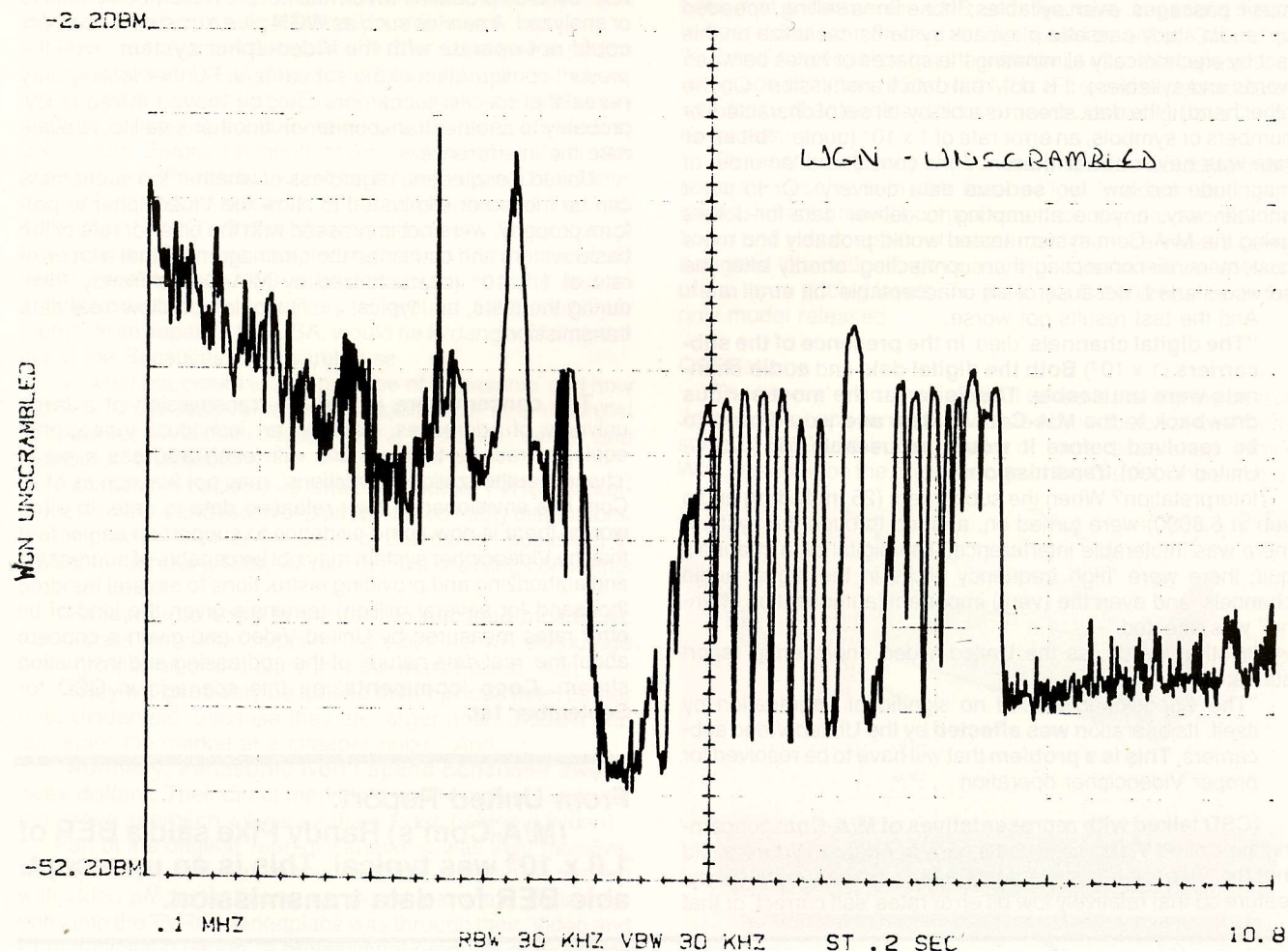
new set of numbers for 'reference' or with the encoder and decoders installed but not actually operational. Finally, the tests we have been working towards; the testing of the full system, with and without subcarriers in place. We'll look at the video engineer's measurements first since they relate to the actual quality of the 'through the loop' system without regard to whether the BER is acceptable or not.

**Interpretation?** From the viewpoint of a video engineer responsible for the operation of an uplink, **the addition** of the M/A-Com encoder and the processing of the video 'through the satellite system' and back out through a receiver (Scientific-Atlanta SA-7500, 'reference receiver'), **the system 'passed' with no real problems.** In fact, if you are into 'fine tweeking' of video parameters, the particular units chosen in this test actually made small improvements in the system performance.

#### BUT The Data/Digital Tests

Unfortunately, the testing involved more than the measurement of the straight video parameters; there were 'user concerns' such as **how would** all of those (25) subcarriers, present in the baseband 'stream', react with the recovery

Test	Non Scrambled WGN/ 6.8000	Scrambled By M/A-Com Videocipher	
		WGN/ 6.8000	WGN + All Subs
Differential Gain	3.7%	2.7%	1.0%
Differential Phase	3.0°	3.0°	3.5°
Chroma/ Luminance Intermod	4.5%	3.0%	3.0%
Chroma/ Luminance Delay	0	0	0
Frequency Response	0 dB	0 dB	+ .2 dB
	-.4	-.4	0
	-.7	-.7	-.2
	-.7	-.5	-.2
	-3.0	-2.8	-2.6



**WGN DOWNLINK SPECTRUM** without scrambling but with all subcarriers in place; display horizontally is 0.1 MHz (left hand edge) to 10.8 MHz (right hand edge). Chart courtesy of United Video.



of the digital data? **How would** the 'digitizing' of the baseband subcarrier stream relate to the ultimate recovered baseband audio and data which radio station affiliates fed by the Satellite Music Network (SMN), for example, depend upon?

**The digital audio channel**, the main audio channel for the program video, had a recorded BER of  $1 \times 10^{-5}$  without the extra 24 subcarriers present. When the subcarriers were added, the BER jumped to  $6.12 \times 10^{-5}$ .

As United Video would summarize the tests of the BER: **"The bit error rate was never better than  $1 \times 10^{-5}$  under any conditions; this may be suitable for digital audio, but would have to improve by an order of magnitude for 'real' data transmission."**

(M/A-Com took special concern with the preceding quotation in the United Video report pointing out that  $1 \times 10^{-5}$  is, in their studies, **more than adequate** for 'real data' transmission. The problem here seems to be one of semantics; perhaps United is not speaking the same 'bit error rate language'.)

'Digital audio', i.e. program audio accompanying the picture portion of a television transmission, is 'digital data' alright **BUT** because of the nature of program audio (an erratic 'data stream' with significant 'time' or 'space holes' between words, music passages, even syllables; those firms selling 'speeded up' audio study cassette playback systems capitalize on this fact by electronically eliminating the spaces or holes between words and syllables), it is not 'real data transmission'. On the other hand, if the data stream is a bit-by-bit set of characters or numbers or symbols, an error rate of  $1 \times 10^{-5}$  (quote: **"bit error rate was never better than . . ."**) is considered 'an order of magnitude too low' for 'serious data delivery'. Or to put it another way, anyone attempting to deliver data-for-dollars using the M/A-Com system tested would probably find more customers 'disconnecting than connecting' shortly after the service started, because of an unacceptable 'bit error rate'.

And the test results got worse.

**"The digital channels 'died' in the presence of the subcarriers ( $1 \times 10^{-2}$ ). Both the digital data and audio channels were unuseable. This is by far the most serious drawback to the M/A-Com system and would have to be resolved before it would be useable for (WGN/United Video) transmission".**

Interpretation? When the subcarriers (25 including audio sub at 6.8000) were turned on, and fed through the system, there was intolerable interference. The digital data channels quit; there were 'high frequency clicks in the digital audio channels' and even the (very) important 'authorization channel' was affected.

In other words, as the United Video engineering report states:

**"The videocipher caused no significant degradation by itself. Its operation was affected by the United Video subcarriers. This is a problem that will have to be resolved for proper Videocipher operation . . ."**

(CSD talked with representatives of M/A-Com concerning the United Video 'BER' tests early in August. We were told that the Videocipher system has a built-in 'data redundancy' feature so that relatively low bit error rates 'self correct' or that

### From United Report:

**"High frequency clicks were present on the digital audio channels . . ."**

errors are 'masked' by the system. The data being sent, whether digital audio or digital instructions/text, 'interleaves' effectively taking it 'out of sequence' so that noise bursts occurring in a particular point in time do not affect **consecutive bits** of data; thereby facilitating the correction process. M/A-Com also faulted United Video for not being prepared to conduct the tests with a method that would allow individual subcarriers to be turned on and off to determine during testing the actual subcarriers which may have been causing problems. M/A-Com is presently doing a laboratory 'simulation' of these tests to identify the offending subcarriers and to attempt to correct for the problems reported here by United Video.)

### Conclusion

The testing by United Video (WGN) of the M/A-Com system revealed problems which had not previously been studied or analyzed. A service such as WGN plus a host of subcarriers **could not operate with the Videocipher system** given the present configuration of the subcarriers. Further testing **may reveal** that specific subcarriers could be 'moved' in frequency, probably to another transponder on another satellite, to eliminate the interference.

United's engineers, regardless of whether the subcarriers can be moved or eliminated to allow the Videocipher to perform properly, were not impressed with the bit error rate of the basic system and cautioned their management that a bit error rate of  $1 \times 10^{-5}$  (characterized by M/A-Com's Randy Pike, during the tests, as "typical . . .") would not allow 'real data transmission'.

**The concern here** is that the transmission of a large universe of addresses, **each** to an individual Videocipher equipped receive terminal and with **each address** a set of 'channel authorization instructions', may not function as M/A-Com has envisioned in their released data to date. In other words, there is now some evidence to support an earlier fear that the Videocipher system may not be capable of addressing and authorizing and providing instructions to several hundred thousand (or several million) terminals given the kind of bit error rates measured by United Video and given a concern about the 'real data nature' of the addressing and instruction stream. **Coop 'comments'** on this scenario in CSD for **September 1st**.

### From United Report:

**"(M/A-Com's) Randy Pike said a BER of  $1.0 \times 10^{-5}$  was typical. This is an unacceptable BER for data transmission."**



## JAPAN'S BEST: Panasonic C-2000

### ROUND Two

'Panasonic.' One of the most respected names in home, consumer electronics worldwide. 'Panasonic'; an operating division of Matsushita Corporation which is measured in the 'top 25' business firms worldwide. How could a TVRO receiver, branded 'Panasonic,' fail? Everyone thought it was a 'shoe-in' for sales success from the moment late in the fall of 1984 when its appearance was formally announced.

Only Panasonic has not become a sales nor a performance leader in TVRO. After an initial industry product showing in March/April at the STTI/SPACE show, an initial early shipment of perhaps 2,000 model C-2000 receivers went to distributors. Before the month of April wound down, April 19th to be precise, Panasonic would be issuing a 'product bulletin' to distributors (and dealers). Some would later call the April 19th notice 'TVRO's first product recall bulletin.' Regardless of how it came out, or was interpreted, the April 19th notice would haunt Panasonic C-2000 sales for several months and an anticipated production delivery of around 5,000 units per month, from Japan to the USA, would be in danger of stagnating at the Secaucus (NJ) warehouse.

So what happened to the 'promise of Panasonic' and how did the C-2000 receiver actually 'measure up' after the initial 'product recall' bulletin floated to the bottom of dealer and distributor 'in baskets'?

Panasonic's decision to enter the home TVRO marketplace with a C-band receiver plainly worried many distributors. In our preview look at the state of distribution published in CSD/2 for January 15th, we had distributors filing comments such as these:

**"Panasonic's entry is the first in our field by a REAL world-class consumer supplier. I predict this will encourage even greater off-shore entry into the marketplace."** Or,

**"They will probably be able to lower prices even further than Uniden did, because they are larger (than Uniden) and can enter the market at a cheaper price."** And,

**"Normally, Panasonic won't spend consumer awareness dollars. Their direct marketing and two-step distributor marketing approach will cause them to lag behind (Uniden)."**

Part of the original 'fear' of Panasonic was their massive, well operated, and well funded national distribution system with video products. But as we would learn, the Panasonic entry into the TVRO marketplace was through their 'Video and Communication Group,' a professional-products group which deals in ENG television cameras, commercial VTR decks and products which are never offered to the consumer distributors/dealers. Panasonic's **Henry Hammerstein** planned a

'slow entry into TVRO' from the beginning (see CSD/2, January 15, 1985). He wanted to capitalize on the brand-name-recognition of his product and cited examples of consumer awareness of Uniden, for example, versus his firm. Hammerstein also felt that when consumers found out Panasonic built TVRO receivers, they would **'ask for it by name,'** because of the name-recognition factor. He forecast that while, 'until now, **dealers** have made the brand decisions for customers by their recommendations, having a Panasonic receiver on the shelf will help the consumer make **his own** brand decision.' The same brand-recognition marketing philosophy would also follow a later Japanese consumer entrant (**Kenwood**) into the marketplace.

Alas, Panasonic's marketplace penetration may have turned out to be even smaller than the 'small' which Hammerstein said he would settle for. No precise figures are available, but distributors who signed up for the product line report it has not been moving as fast as they had hoped. Let's see how the C-2000 works.

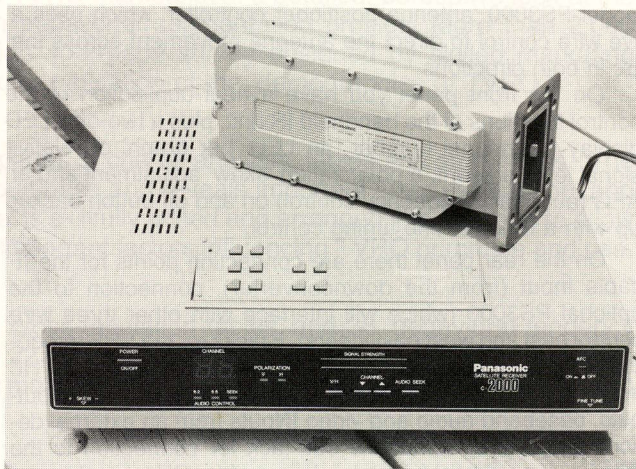
### BASIC Design

The C-2000 receiver is a block design unit using the 950-1450 (Japanese 'standard') BDC range. The concept has been that a companion LNB unit, available in various noise temperatures from 85 degrees up, would be either 'C band' or 'Ku band' functional giving the installer or user the capability of using one common (950-1450 MHz IF) receiver/demodulator with a pair of antenna systems or feeds, covering **both** C and Ku bands.

Panasonic originally announced that there would be three separate receivers in the line-up; low, medium and high priced. Infrared remote control was to be standard across the board and Hammerstein characterized the receivers as being designed to produce 'high quality video performance' at each of the three pricing levels. To date, the C-2000 has been the only model released.

### OPERations

The 'theme' of our multiple-part series featuring 'the best of Japan' is perhaps somewhat violated by inclusion of the Panasonic C-2000 unit in the quartet of units researched. Why? Well, based upon the pricing range of the C-2000 and some of



**COMBO/** The C-2000 with companion (85 degree rated) LNB makes up the package offered to dealers. Handheld remote 'stores' in recessed area at top of receiver cabinet.



the features present, this receiver is aimed more at the 'middle end' market than the top-end which 'the best of Japan' seems to imply.

An explanation. 'The best of Japan' is more of a statement about engineering 'perfection' and 'thoroughness' than about features. No receiver is ever likely to have every feature on board; bells and whistles tend to propagate additional bells and whistles which in turn sire more bells and whistles (and on and on into infinity). In other words, electronics is a constantly self-improving process to itself **and no design is ever complete.**

The Panasonic C-2000 offers 'the best of Panasonic' which in turn must attract attention because it is also 'the best of Japan's largest.' And thus we find ourselves pondering the fate of this receiver along with those from **Uniden** (see CSD, August 01), **DX** (CSD, September 1st) and (**USS/Maspro** (CSD/2, September 15th).

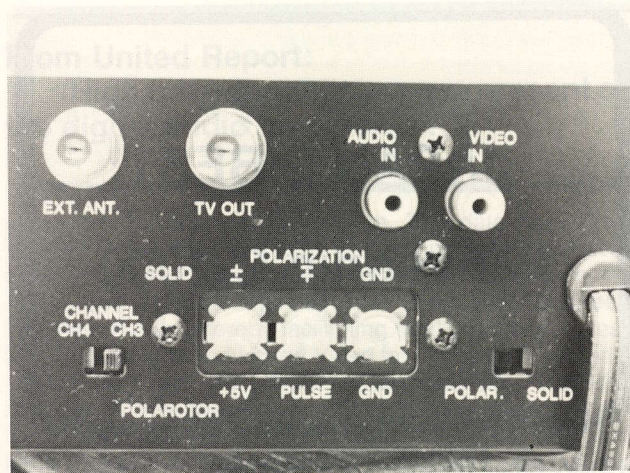
Operating Instructions (a printed manual) instantly tip you off that this product originated at a significant (Japanese) electronics firm. While not elaborate nor complex, it has the look and thoroughness of every VHS videorecorder manual you ever took out of a carton. Unlike virtually every other manual you have ever seen, it not only does not confuse but it actually **makes you understand** what each control and connector do. There is an 'art' to proper manuals and Panasonic is one of the masters of the art. Other manuals, even the elaborate Uniden manual for their 7000 series receiver, are just as thorough (perhaps more so) but the information imparted must be 'ried from the pages' while with Panasonic it simply 'rolls off' into the reader's mind. Those charged with the responsibility of creating informative and useful user manuals would do well to obtain a copy of the C-2000 printed instructions as a 'guide' to effective manual text **and** layout.

The C-2000 has an infrared remote control which allows the user to operate the receiver from a nominal 20 foot distance (maximum). The remote turns the unit on and off, reverses polarization, toggles between 6.2 and 6.8 MHz aural subcarriers, does automatic subcarrier tuning for non-standard subcarriers, toggles up a channel at a time, or down a channel at a time and increases or decreases the receiver audio volume level.

The remote also gives the user east or west control over an antenna positioner; to use this feature the buyer must have a model PS3000 'antenna positioner controller' which uses a five wire control to direct the antenna movement across the arc in both directions.

On the front panel you have a near-duplication of the control functions of the handheld IR unit, plus a two-digit LED display of channel number, an LED 'bar graph' of relative signal level present, a polarization 'skew' adjustment and an AFC (automatic frequency control) on and off button backed up with a receiver fine tuning control.

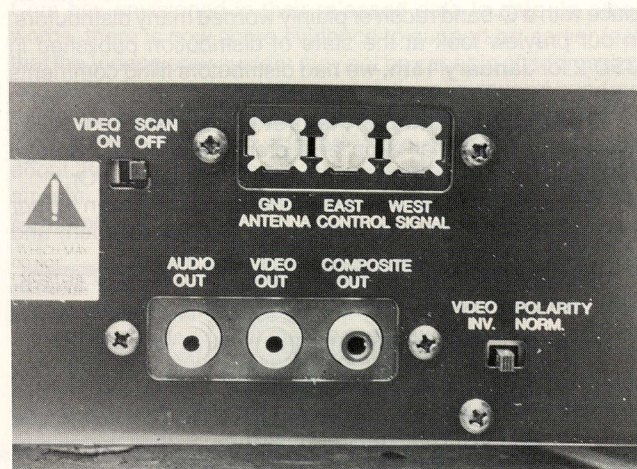
On the rear panel there are connection points for the IF cable input (from the downconverter), connection to the optional PS3000 (which will interface with other three wire control east and west positioners), F jacks for the VHF remodulated output (channel 3 or 4; +5 dBmV) and an external VHF antenna or VCR RF source, baseband audio and video outputs, baseband audio and video **IN**puts from an external descrambler (\*), a 'composite out' jack for connection to the **IN**put on an external (video in) descrambler OR to an external stereo/narrow band audio/data tuner. Rear panel controls consist of video polarity, VHF channel 3 or 4 remodulation, either of two polarization device formats, and video scanning



C-2000 rear panel includes external (VHF) TV antenna switch-through, plus 'unusual' video and audio 'input' jacks which were originally designed for returning unscrambled baseband to receiver's internal modulator.



C-2000 rear panel also includes normal 950/1450 MHz input F connector for RG-6/U or 59/U cable coming from LNB, a video-scan control for possible use during initial antenna alignment, and a 'meter adjust' to set the bar (LED) graph front indicator for cable length and on-scale reading.



C-2000 rear panel also includes connections for external (optional) antenna controller and 'composite output' for feeding an external baseband input descrambler (see text).



# THE BIG BLACK BOOK THAT UNLOCKS THE SECRETS OF THE TVRO MARKETPLACE



- WHO —** really makes up the 1985 TVRO marketplace? Is the marketplace shifting from rural to suburban?
- WHAT —** motivates people to buy TVRO? Movies, sports, news??? How important to TVRO owners are the **unscrambled** network TV signals?

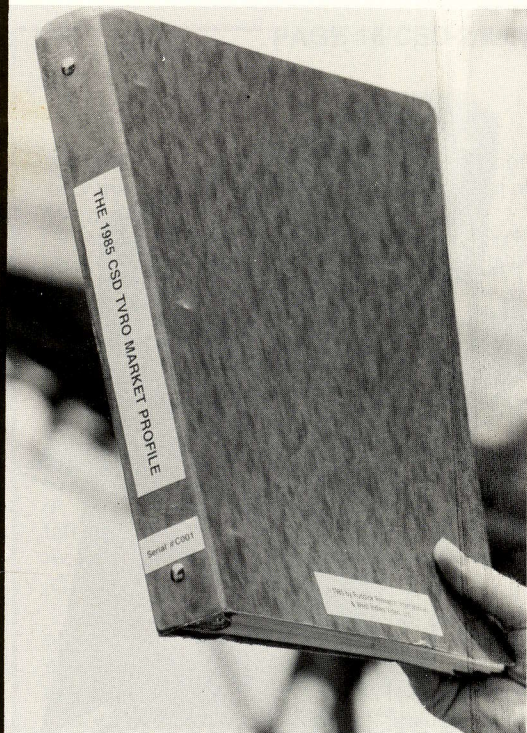
**NOW** for the first time there is a 'definitive profile' of the TVRO marketplace; a detailed, perceptive look at the demographics of the TVRO consumer, complete with behavioral segmentation profiles! More than 2,000 present-day owners of TVRO completed a 43 question, four-page survey designed by skilled marketing strategists to elicit data which would allow a full computer tabulation of the 'demographics of TVRO.'

**THE 1985 (CSD) TVRO Market Profile** contains 150 pages of charts, analysis, tables and summaries. 'The Profile' provides insight into the motivations of TVRO purchase and reveals important 'user satisfaction' and TVRO system 'use profiles' for the first time. 'The Profile' is skillfully edited and arranged into sections to allow cursory, intermediate and in-depth analysis of all of the important factors influencing TVRO purchase and use.

**Within the 150 pages** there are 32 'basic tables', 49 'cross-tabulation tables' and 38 'behavioral tendency tables'. A 16 page 'Executive Summary' backed up by 22 pages of 'summary tables' is tailored for the busy management person who needs to understand the basic motivations of TVRO but who does not have the time to prepare his own analysis.

'The 1985 (CSD) TVRO Market Profile' is available to you on a confidential basis for use limited to within your organization, and it may not be reproduced nor printed in any form without the written consent of the copyright holders.





**METHODOLOGY/** Nearly 5,000 home TVRO system users were identified through an arrangement with a cross-section of TVRO hardware original equipment suppliers. A random sample of warranty registration card files provided a master 'survey universe' covering the period 1980 through 1985, spread over all regions of the United States and outside the USA where DOMSAT (domestic US satellites) can be received. Survey results are based upon 2,086 responses (43.6%) received by the specified cut-off date. The study was conducted under contract by Ruddick Research International.

**Partial listing of questions included in original survey form:** How long had satellite earth station? **Region of country?** Primary use of system? **Factor that convinced you to buy system?** Number of broadcast television stations you receive? **Currently have access to cable TV system?** A subscriber to the system? **Pleased with cable service receive(d)?** Total number of hours per week satellite system used by all members of household? **Satisfaction with satellite receiving equipment?** Satellites tuned-in three or more times per week? **Category of programming viewed most frequently by household on satellite?** Categories of programming viewed next-most frequently? **Important source of satellite programming information?** Main benefit expected from satellite equipment? **How much spent on satellite receiving equipment?** Other electronic equipment currently have or own in home? **Live in incorporated city or town?** Population of city or town? **How far from residence to nearest city of 100,000 population or more?** Anticipate replacing or adding satellite receiving equipment within next 12 months? **Equipment plan on buying?** Age of head of household? **Family status of household?** Income of household? **Education of head of household?** Occupation of head of household? **Publications subscribed to or read regularly?** Programming sources viewed through satellite: **ABC, CBS, NBC, WTBS, WGN, USA Network, CBN, ESPN, HBO, Cinemax, Showtime.** Type of products usually purchased? **Buy sooner if on credit?** Generally a 'risk taker' in purchasing? **When shopping, generally buy more than anticipated?** Use 800-toll-free numbers when shopping? **Tend to buy merchandise based upon lowest pricing?** Consult literature and publications for education before buying? **Generally compare prices before buying?**

**Partial contents of '1985 (CSD) TVRO Market Profile':** **Market Characteristics/** Location of residence in cities-towns; Age of head of household; Family income levels; Family status of household; Location of residence by region; Educational level of head of household; Occupation of head of household; Magazines subscribed to or read regularly. **Behavioral Segmentation Profiles/** Urban novelty seeker, Impulsive credit buyer, High-tech innovators, costly system owner, upscale low-end user. **Purchase Dynamics/** Length of ownership; Factors in purchasing decision; Number of broadcast stations able to receive prior to TVRO; Major benefit expectations; Cable TV access-subscription-satisfaction; Electronic equipment cross-ownership; TVRO system upgrade potential (age of system, cable access-subscription-satisfaction, equipment cross-ownership). **Usage Patterns/** Viewership; Satisfaction; Satellites viewed; Types of programming viewed; Services viewed (Viewership, Programming viewed).

## HOW TO ORDER:

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PLEASE enter our order for a single copy of the 150 page '1985 (CSD) TVRO Market Profile'. Our check for \$1,000, to West Indies Video, Ltd., is attached. We understand that this 'Profile' is being sold to us with our agreement that no portions may be duplicated for distribution nor published without the written consent of the copyright holders. We also understand that our copy will be sent via Federal Express within two working days of receipt of our order and payment.

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(Telephone 305/771-0505)



(i.e. channel scanning).

Controls and buttons aside, Panasonic has designed the unit so that the installer can break an **internal** IF line to install a terrestrial interference filter internal **within** the unit. There are several problems with this approach:

- 1) The filter must operate at the IF frequency range of **510 MHz** to be most effective since that is the 'second IF' chosen for the unit. At presstime, ESP was predicting the availability of such a filter sometime **after** 1 September. Fitting the ESP filter inside of the case offers the installer a 'challenge' because of bulk; the alternative is to bring the 510 MHz (center frequency) IF line outside by extending the IF line(s); a better choice anyhow since switching the filter 'on' and 'off' as is desirable when there is TI present and not present is hardly facilitated by having it inside of the receiver case.
- 2) Physical size of trapping devices varies; not all of those available will fit internally within the receiver. The **particular** trapping device you need, based upon performance (given the level and type of TI present) may have to go outside the case to be used. This would involve some creative engineering to extend the lines out of the case, to the external trap(s), and then back into the receiver. A set of F jacks, with a jumper/loop of RG-59/U would have avoided this problem.

The C-2000 is not frequency synthesized; i.e. the fabled 'quartz reference' approach now used quite universally by the newer receivers is absent in this model. Panasonic seeks to obtain accurate frequency stability (i.e. non-drifting pictures, always fine-tuned in when channels are selected) through a combination of LNB stability and an AFC circuit. The usual approach here is to make the LNB local oscillator **temperature stable**, using a DRO or dielectric resonator oscillator. Stabilities of  $\pm 1$ , 2 or 3 MHz are claimed by a number of manufacturers using this approach. Then by building in a **receiver AFC** or automatic frequency control, with a 'range' of say  $\pm 3$  MHz, the receiver is able to 'track' LNB stability excursions within the maximum range of  $\pm 3$  MHz. That's the theory.

One of the early 'problems' discovered with quartz reference tuning was that the quartz reference system may be 'too good'; that is, the system is so 'rock solid' in tuning that in the presence of TI (terrestrial interference) the TI signals cannot be 'fine tuned out' because the quartz reference 'refuses to give' enough to allow tuning 'around' the TI signal. Another problem discovered with the early quartz circuits was the non-repeatability of the uplinked transmitters; there is significant 'on-channel' frequency variation between transponders within the same bird, or between birds. In other words, when the uplink transmitter is not on the frequency it should be on, receivers 'pre-programmed' to receive those frequencies have a difficult time recovering good video.

Panasonic took the approach that they would not rely on a quartz-tuned system; perhaps for the reasons cited, or

perhaps because as this receiver was being designed, the quartz-synthesized tuning technology was still in its infancy. There are advantages to not providing a quartz-loop for the receiver, as noted: (1) Some TI can be 'worked around' simply

#### PANASONIC C-2000 Specifications/

LNB Unit: 3.7-4.2 GHz Input, 950 to 1450 MHz output

Through gain not specified

Noise temperature 85° on unit tested (claimed, not measured)

#### Receiver Unit:

Input Frequency: **950 to 1450 MHz**

Input Impedance: 75 ohms with a VSWR (Match) of 2.5:1 maximum

Noise Figure: **15 dB maximum**

Input Signal Level: -65 to -35 dBm range

IF Bandwidth: **27 MHz** (claimed; not verified)

Threshold: 8 dB CNR typical (claimed, actual performance, with LNB supplied, was not measured but would be several dB worse than this)

#### Video:

Output Level: 1 volt peak to peak at **10.75 MHz** maximum input signal deviation (a most unusual way to spec this feature; WGN, as an example, deviates a maximum of 8.6 MHz; see separate report here)

Flatness:  $\pm 1$  dB from 10 kHz to 4.2 MHz

Clamping: 40 dB energy dispersal rejection

Differential Gain:  $\pm 5\%$  typical

Different. Phase:  $\pm 5\%$  typical (normally spec'd in degrees rather than %; 5° peak maximum is M/A-Com compatibility specification)

#### Composite Output:

Output Level: 1 volt peak to peak at 10.75 MHz deviation (see above)

Flatness:  $\pm 2$  dB from 10 kHz to 8 MHz (M/A-Com, for descramblers, asks for  $\pm 0.5$  dB from 50 hertz to 3.58 MHz)

#### Audio:

Subcarrier Presets at 6.2 and 6.8 (6.8 standard return) with audio tuning range in seek position 5.5 to 8.5 MHz

Output Level: 1 volt peak to peak at 75 kHz peak deviation (adjustable in level with IR unit)

Output Impedance: **600 ohms, unbalanced** (adequate to drive VCR deck but not for direct drive to many audio amplifiers without external impedance matching)

Frequency Response: 50 hertz to 15 kHz,  $\pm 2$  dB

Distortion: **2.5% maximum** (claimed) with 1 kHz tone modulating subcarrier to 75 kHz deviation

#### Miscellaneous:

RF Output: Remodulator on VHF channel 3 or 4 (switch selectable) at 5 dBmV or approximately 1,800 microvolts

Line Supply: **105 to 130 VAC, 60 hertz** (power consumption not specified)

Dimensions: 13.0"x2.76"x11.6"

Weight: **10 pounds** (net)

Price: \$259.00 dealer net without LNB unit, \$439, with 85 LNB UF Use: Second IF of 510 MHz; ESP reports 'TI' filter for this frequency range will be available around 1 September.

Source: New Technology Products Group, Video/Communication Division, Panasonic Industrial Company, One Panasonic Way, Secaucus, NJ 07094 (201/348-7000).

\*/ Panasonic made the assumption, when designing this unit, that a **stand alone descrambler** would have video input (scrambled) and **video output** (unscrambled); and that the user would always use his receiver's built-in modulator. What you really have here is a way to couple baseband video and audio to the receiver modulator, from any source (such as a TV camera).

by sliding the receiver off channel a few MHz with the fine tuning control (with the AFC 'defeated' or in the off position), and, (2) Those off-frequency uplinking programmers can be properly 'center tuned' when you have the non-quartz tuning approach. The downside of the traditional tuning system is that frequency stability, transponder to transponder, may suf-



fer in the process.

Remember that the ultimate stability of the receiver is a combination of two factors:

- 1) The stability of the (DRO designed) LNB, and,
- 2) The range and holding power of the receiver's automatic frequency control system.

Our test results with the C-2000 were confusing, at first. We found that the receiver stability was excellent when operated with a **Gensat** block downconverter but not nearly as good with the Panasonic supplied LNB. That in itself is not terribly confusing; the stability of the Gensat downconverter was apparently good enough for the receiver's AFC range to track any minor downconverter variations. On the other hand, the C-2000 used with its own LNB produced less satisfactory results (1).

When the C-2000 was evaluated against its own LNB for **video quality** (primarily video signal to noise ratio) we also found the performance was degraded from a combination of a 90 degree Norsat LNA and the Gensat downconverter. In other words, the C-2000 alone worked very well but the LNB was a 'weak link' in the system.

Our C-2000, obtained from a Panasonic distributor, was one of the first few thousand available. Panasonic did have a 'factory recall' of these early units but the problem was not related to the stability nor sensitivity of the system. In an advisory dated April 19th, Panasonic advised distributors and dealers that a special problem had developed when the receiver was used in conjunction with a 'servo type' polarizer. We quote:

**"We have detected a problem of shutdown of the power supply** feeding the polarizer circuit when a servo type polarizer is used. This shutdown occurred under certain environmental conditions and is indicated when both the V and H polarization indicator lights are extinguished. The circuit resets itself when the main power switch is cycled OFF and ON. This shutdown does **not** occur when a solid state polarizer is used with multiple receiver installations . . ."

This was apparently an 'irritating problem' rather than an equipment damaging problem since, as Panasonic advised, **"No damage** to the polarizer or the receiver occurs during shutdown." Panasonic requested that all sales of the receivers 'be stopped immediately' and ultimately they would perform a repair of the faulty circuit with a modification that corrected the problem.

In an industry where similar problems have gone either unnoticed or the OEM has denied 'blame,' **it was refreshing to have an OEM** admit the problem and create a method of repairing the problem for those dealers and distributors stocking the unit. Unfortunately, the 'recall' had a negative effect on the dealer 'attitude' for the unit and some dealers simply adopted a "Let's wait and see, say nine months . . ." attitude concerning the product.

1/ Reviewer Mike Gustafson, writing in **Satellite Retailer Magazine** for July (1985) also found the C-2000 performance with the Panasonic-provided 85 degree LNB 'disappointing.' Gustafson found that substitution of another LNA and block downconverter cured the sensitivity problem, as do we here. We note this as evidence that the LNB we received with our receiver was not a one-only 'lemon' situation. Gustafson **also found** the automatic frequency control system 'disappointing,' and we cannot concur with that finding as far as the C-2000 unit we tested. The AFC 'instability' could also be affected by the downconverter chosen.

In truth, the problem was not **unexpected**; on page 7 of the extensive user manual, Panasonic printed:

**"NOTE:**

**While the skew is adjusted**, the V or H lights may be extinguished under certain conditions. If this occurs, re-center the skew control and turn the main power OFF and ON which resets the circuit. If this condition reoccurs, the problem may be **moisture entering and freezing** the servo polarizer."

### VIDEO Performance

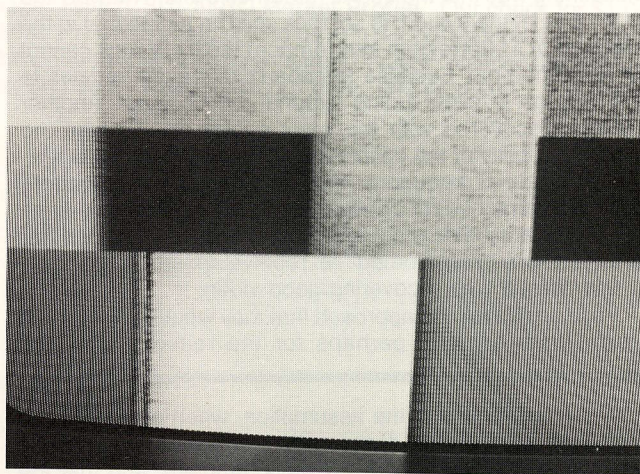
The C-2000 video performance is good, provided the companion LNB unit is functioning properly. As noted, we were not pleased with the LNB **supplied** with the receiver but found performance acceptable when a stand alone LNA and downconverter were substituted.

Video performance in the critical areas which one can 'measure' using a satellite transmitted split-screen color bar pattern (see photos) was above average. Transitions from dark to light and light to dark are exceptionally clean (see photo) and the video performance in this area would rank in the top 10% of all receivers tested. Ultimate receiver sensitivity, a function of the LNB or other 'front end' hardware may well have been a problem with earlier units which has been corrected in more recent LNB packages.

The receiver scans up and down, a channel at a time, using either the remote 'toggle' or the front-of-receiver toggle switches. You **cannot** punch in a particular transponder number, as with many other receivers. During the channel change the receiver audio 'mutes' or falls silent and the audio comes back only if the audio subcarrier setting finds 'active audio' on the new transponder on the subcarrier (selected).

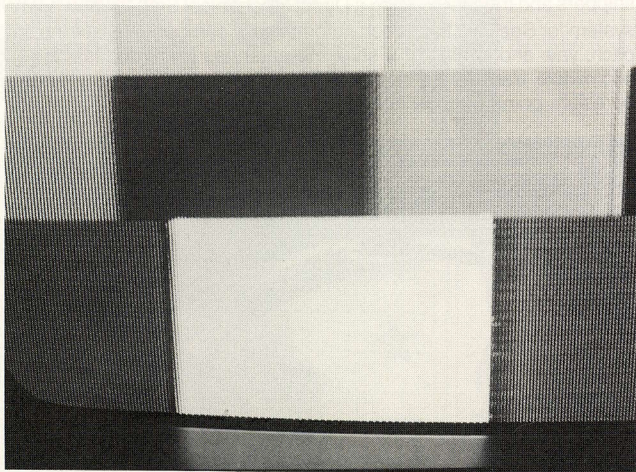
Audio performance is also good for standard audio deviations (i.e. 75 kHz) and adequate for wider deviations (i.e. Disney). For the narrower subcarriers, the audio bandwidth selected (not specified but we suspect it is in the 200 kHz region) audio reception is noisy on weaker transponders. The audio tuning system is a trifle unique:

- 1) The receiver **automatically selects 6.8 MHz** when turned on or when a channel change takes place;
- 2) A **second 'pre-set'** audio position of **6.2 MHz** is also



**NOT SO CLEAN/** notice 'jagged edges' between lower-left dark color and middle light (white) color; transition from dark to light in this comparison receiver (NOT C-2000) shows telltale signs of video demodulator distortion.





**CLEAN/** notice transition from dark to light is clean, vertical line separating the two color 'edges' is straight and without disturbances; C-2000, when equipped with Gensat downconverter and Norsat LNA produced clean pictures (see text).

available on the remote and at the receiver-proper controls;

- 3) The user can 'scan' for other audio subcarriers (between 5.5 and 8.5 MHz) from the remote or the receiver by pushing a button. The receiver will scan, and stop, whenever a subcarrier is located. During this 'scan' mode you hear nothing as the audio output stage is 'squelched' or muted.

#### LONG-Term Design

In addition to providing baseband audio and video outputs, including a 'composite output' to feed a descrambler, internal to the receiver is a 'clamp on/clamp off' switch. This means that given those scrambler systems which require an unclamped composite source, the receiver is ready to provide the required video format.

A dealer should be aware, however, that **M/A-Com feels many receivers**, even equipped with unclamped composite outputs, **may not perform** with the VC2000E baseband input descrambler system because of 'design parameters' found in the receiver demodulator section. Until a C-2000 receiver has been tested with the VC2000E stand alone descrambler, in the composite input mode to the descrambler, the mere presence of this 'output source' may not signal proper compliance for VC2000E interfacing. If the C-2000 should prove to be incompatible with the M/A-Com VC2000E descrambler, anyone using a C-2000 will then be required to bring the 510 MHz 'IF' line within the receiver outside for looping to (and through) the VC2000E 'IF input' port (assuming availability of 510 MHz descrambler).

#### SUMmary

The C-2000 from Panasonic is a 'toe-in-the-water' unit created to test our industry's reaction to the presence of the giant Japanese firm. It has maintained, as promised by Henry Hammerstein in CSD/2 for January 15th, a 'low profile' in the marketplace. The original plan was to introduce 2,000 of the receivers the first month (April 1985) followed by a staged increase to approximately 5,000 per month by this fall's selling season.

**We found** video performance above average if you substi-

tuted something at the front end for the LNB which we bought with the receiver. We found the remote control acceptable and audio performance quite 'stock' for a single bandwidth design that does not offer narrow band recovery.

We suspect, and label it as an editorial opinion, that Panasonic has not been encouraged by the marketplace acceptance of the receiver to date. In a market where their name alone ('PANASONIC') should result in good consumer vibrations against TVRO receiver names which virtually nobody recognizes outside of TVRO, we feel that dealers who want to have 'customer recognition' of brand name products would find the Panasonic receiver a useful addition to their showcase. We also suspect that given the pricing structure of the receivers and the LNBs that many consumers would opt for lesser known products, however, if they took the time to compare features and performance against the C-2000.

By 'testing' the marketplace through a special division that specializes in professional video products for educational and institutional markets, Panasonic has reserved several options to itself down the road. It will be interesting to see how they handle the continuation of the product line during 1986 and whether 'Panasonic' continues to be available with C band TVRO hardware in North America.

#### NEW PRODUCTS/ continued from page 6.

antenna and mount fold for easy shipment or storage and the total weight is 28 pounds.

**Arcfinder Manufacturing, Inc.** (115 East Linden, Rogers, Arkansas 72756; 501/631-2200) has moved into expanded facilities with greater production capabilities. The firm expects to announce additional TVRO products shortly.

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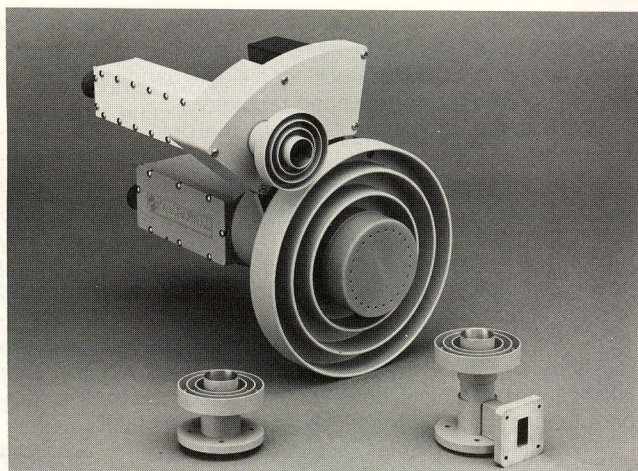
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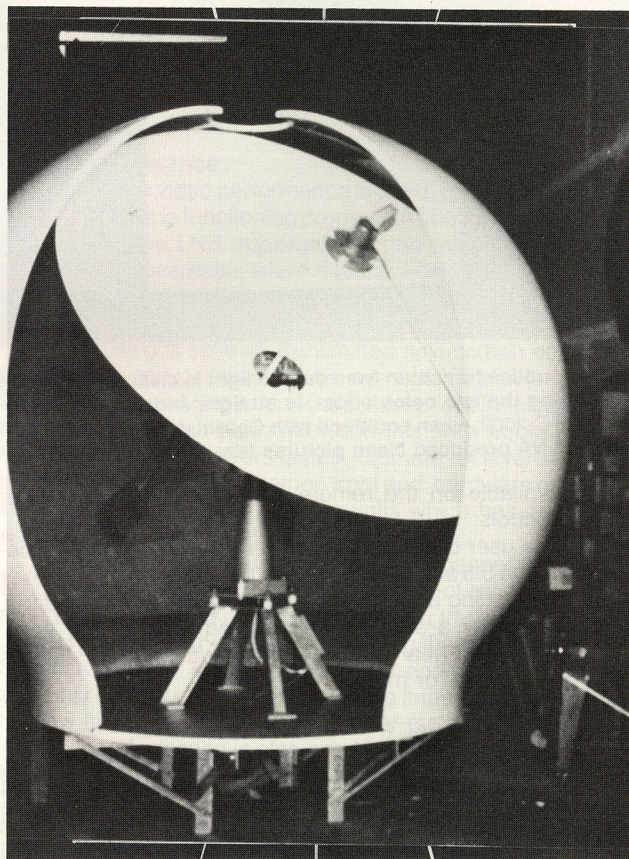


CHAPARRAL piggy-backs 12 GHz on 4, or stands-it-alone

**Chaparral Communications** (2360 Bering Drive, San Jose, California 95131; 408/262-2536) has introduced a complete line-up of **12 GHz feeds** including the first polarization rotation 12 GHz feed. The 12 GHz Polarotor® can be retrofitted to existing 4 GHz systems. A two-bolt connecting flange adapts to virtually any 4 GHz scalar type feedhorn, setting the 12 GHz feed 'off to the side' of the lower frequency feed. Adjustable f/Ds of from .33 to .45 are compatible with the new feeds which cover the frequency range of 11.7 to 12.2 GHz (European 10.7 to 11.7 GHz feeds are also available).

**Danex Microwave** (275 Woodland Drive, Vancouver, BC, Canada V6L 3S7; 604/251-2218) has supplied some of the first 'high seas' TVRO terminals which will provide satellite television to maritime

shippers and travelers. Using a Direct Mechanical Stabilization (DMS) system for Sea-Tel, Inc. which automatically compensates for the roll, pitch, yaw and turning of a ship, the antennas (mounted inside of a microwave transparent dome) will stay within 0.5 degree of being boresight pointed at the intended satellite.



CUTAWAY shows Danex antenna on DMS system for Sea-Tel, Inc.

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**Microdyne Corporation** (P.O. Box 7213, Ocala, FL 32672; 904/687-4633) has a new data sheet available depicting the full specifications, drawings and photographs of top-end motorized mounts created for (television) broadcast system TVRO antennas. The motorized polar mount antenna drive systems are for antennas between 3 and 7 meters in diameter.

**ODOM Antennas, Inc.** (P.O. Box 1017, Beebe, Ar. 72012; 501/882-6485) has a new President and CEO: **Randall V. Odom** who founded the firm. Odom will also continue to serve as Chairman of the Board of the pioneering firm in TVRO antennas (1979). Former President, Bob Mullenax, resigned to serve as President for Certified Industries, a Cabot (Ark.) firm manufacturer of mesh antennas.

**Raecom Communications** (6961 Trans Canada Highway, Duncan, BC, Canada V9L 3W8; 604/746-5091) has introduced their new 'Thor 10' antenna with a 10'4" diameter and a ten-year warranty. The antenna claims 40 dB of gain, has a .375 f/D with declination adjustments from 25 to 70 degree latitude. The antenna has sealed ball joints on a polar tracking mount, east or west jack mounting and uses radar mesh for the reflective surface. An introductory sample is available for \$650 (Canadian).

**Toki Satellite Systems** (21012 Victory Blvd., Woodland Hills, Ca. 91367; 818/704-6033; 800/624-4235) has added their model TP110 east/west antenna positioner with digital display of satellite location. The system has 'electric limiters,' diode limit indicators, a dual voltage supply and carries one year parts and 90 day labor protection for dealers.



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**Raydx Satellite Ssytems** (9 Oak Drive, Silver Springs Shores Industrial Park, Ocala, Fl. 32678; 904/687-2003) has been awarded a 'New Product Award' by Florida Governor Graham in an annual competition sponsored by the Florida Professional Engineers and the Florida Department of Commerce.

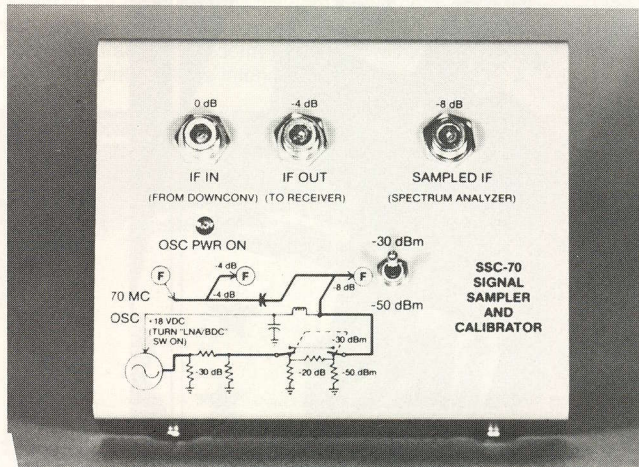


**PROUD of award, James E. and Mrs. Wetz, Robert L. Hooper, Mrs. Laurie Yonge, Lawrence W. Yonge (III) and Mrs. Cynthia Yonge of Raydx at Governor's ceremony.**

**Avantek, Inc.** (3175 Bowers Avenue, Santa Clara, Ca. 95051; 408/727-0700) has announced a pair of new **block downconverters** for TVRO; model ABC 40930 inputs 3.7 to 4.2 GHz and outputs 430 to 930 MHz while model ABC 41450 has an output of 950 to 1450 MHz.

**AVCOM, INC.** (500 Southlake Blvd., Richmond, Va. 23236; 804/794-2500) has introduced a signal sampler and calibrator (**model SSC-70**) for use with their new PSA-35 portable spectrum analyzer. The unit samples TVRO downconverter outputs in the 30 to 200 MHz range for feeding into the PSA-35 to allow precision display of TI and other signal sources. An internal oscillator provides calibration for

amplitude and frequency.



**AVCOM Samples and measures**

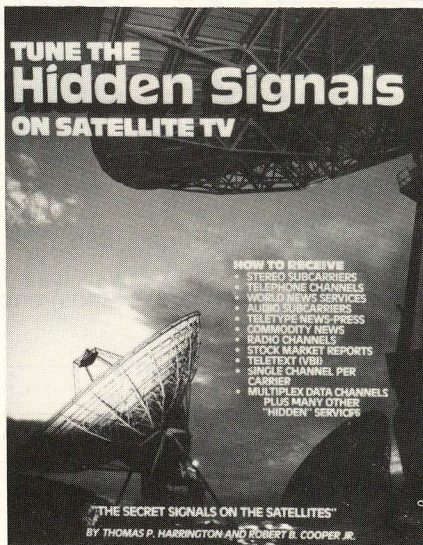
**AVCOM** has also introduced their **TISH-40** feedhorn for use with their PSA-35 portable analyzer for location of terrestrial interference sources. The horn has 25 dB of gain over 3.7 to 4.2 GHz and features press-fitted stainless steel nuts for rapid connection to an LNA.

**Brooks Satellite, Inc.** (Matawan, NJ) has begun a sales drive to 'convert' existing TVRO dealerships to franchise store operations for the Brooks chain. Brooks presently has seven stores operating in six states with two new stores scheduled to open this summer.

**NEW PRODUCTS/ continued on page 27**

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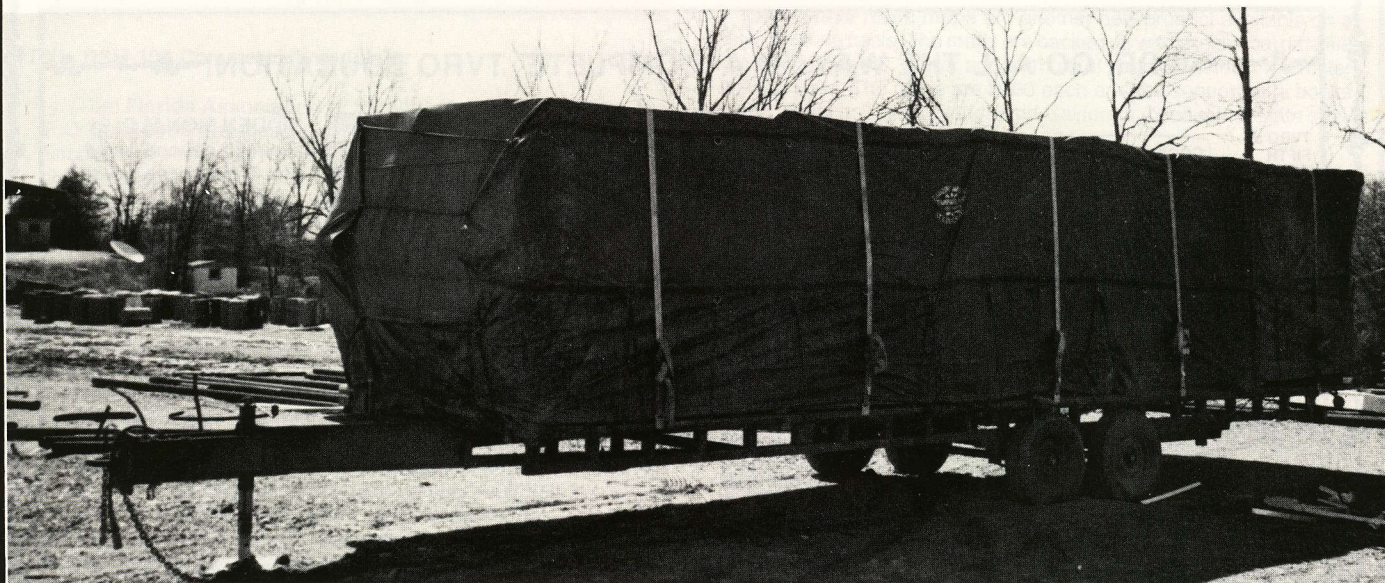
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Poplar Bluff, Missouri 63901  
314/785-5988



(a very) SPECIAL  
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ISSUE!

COOP'S  
SATELLITE  
DIGEST

\$15.00



# THE EXCITEMENT OF TVRO COMES ALIVE!



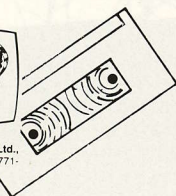
**AN EXCITING story** of the creation of an American technology; backyard inventors laboring to conquer the unknown! A scientific-revolution spawned in basement workshops by people who refused to accept the advice of large corporations "who knew it could not be done!" **TVRO** — the first five years, written and compiled by Bob Cooper. 180 pages, colorful, concise and excellent reading. From the first 20 foot monster dishes to today's tuck-away 4 foot dishes. It is exciting, it is real, **and it is happening now!** 180 pages that will make you a true believer!

**OR, GO ALL THE WAY TO A 'COMPLETE' TVRO EDUCATION!**

TVRO's  
FIFTH  
BIRTHDAY  
PARTY!



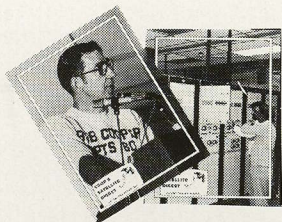
Produced and distributed by West Indies Video, Ltd.,  
P.O. Box 100858, Ft. Lauderdale, FL 33310 (305/771-0505)



**TVRO's 5th BIRTHDAY:** A giant two-hour TV special aired on satellite 10-18-84. See how TVRO was made legal, rare footage of early TVRO inventors, NBC and CBS network coverage. Entertaining, informative, exciting. VHS, 2 hour format, high production qualities.



**HIDDEN SIGNALS:** Excitement beyond belief; non-TV services world-wide transmitting via satellite; 'The World At Your Fingertips'; what it is, the equipment required.



**THE SCHOLAR'S REFERENCE BOOK SET:** Two volumes of **CSD Anthology**, more than 1,000 pages tracing in minute-detail ALL of the early equipment and services that ultimately turned into today's modern TVRO industry. **The ultimate TVRO reference book set** totally immerses you in the world of TVRO. Originally sold worldwide for \$125; see special pricing here.

**ORDERS ROUTINELY SHIPPED 1st-CLASS/AIRMAIL or UPS WITHIN 24 HOURS OF RECEIPT.  
TELEPHONE ORDERS MAY USE VISA/MASTERCHARGE/CHOICE CARDS!**

#### I WISH TO ORDER:.

- \_\_\_ 180 page 'TVRO Story': \$12 postpaid.
- \_\_\_ TWO-HOUR TV SPECIAL: \$30 postpaid.
- \_\_\_ **HIDDEN SIGNALS:** \$15 postpaid.
- \_\_\_ TWO VOLUME **CSD ANTHOLOGY:** \$50 postpaid.
- \_\_\_ **SPECIAL VALUE/** all of above (value \$105) for **special package price** of \$95!

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**NOTE:** If shipment going outside of USA (including Canada), all remittances MUST BE in U.S. funds and add \$5 per item ordered for additional airmail/handling charges.



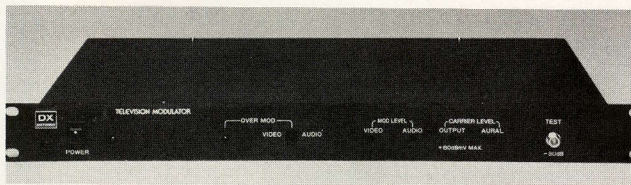
## NEW PRODUCTS/ continued from page 24

**R.L. Drake CO.** (P.O. Box 112, Miamisburg, Ohio 45342; 513/866-2421) has released an announcement that the firm 'is available for merger or acquisition.' Drake formed in 1943 manufacturing VHF and HF communications equipment for the war effort. Drake entered the TVRO field in 1981 and had shipped more than 270,000 receiving units by early this summer. Sales results for recent years were:

Year	Gross Sales	Net Income	Profit Ratio
1982	\$14.2M	\$ 2.4M	16.9%
1983	\$30.0M	\$ 5.5M	18.3%
1984	\$69.4M	\$14.0M	20.2%

Drake now manufactures all of its equipment in a new facility near Franklin, Ohio (Dayton) and has more than 500 employees. A Manhattan firm, **Manhattan Venture Company** (340 East 57th Street, New York, NY 10022; 212/688-4445) is handling the search for a suitable corporate merger or sale of the Drake firm. Drake is privately owned by children of R.L. Drake who founded the firm..

**DX Communications** (10 Skyline Drive, Hawthorne, NY 10532; 914/347-4040) has introduced a +60 dBmV output commercial modulator for SMATV and cable applications. The saw filtered unit is designed for adjacent channel operation as a companion to the firm's model 643A SMATV and cable TVRO receivers.



DX's DSM-100 Commercial modulator

(The) **Florida Association of Satellite Television Dealers, Inc.** (P.O. Box 10463, Tallahassee, FL 32302; 904/877-0888) has a membership drive now underway. The group hopes to improve the professional image of TVRO retailers and installers in the state and enhance the professionalism of TVRO in Florida by representing TVRO before the state legislature. Florida, with a high number of cable and SMATV systems, has a particular problem with potential TVRO dealer licensing and regulatory statutes and has been a hot-bed of TVRO zoning and regulatory problems for several years. **Richard H. Miller** is heading up the effort.

**Fantasy Unrestricted Network, Inc.** (FUN Channel) has undergone yet another change with founder **Chuck Dawson** stepping away from the service as its president to form another (pay per view) adult service called Personal Preference Video (PPV). In the change, the FUN channel has moved to Fort Worth, Texas (817/332-7294) where Robert Stienman is the new firm president. PPV will remain at the previous FUN address and telephone number (408/559-8812).

**General Electric Corporation** has introduced their first product for the home TVRO market; **'Control Central™ System.'** The new package is a handheld remote control that replaces every other handheld remote control in the TV system in the house; a single handheld unit will operate the TV set, the VCR, the cable converter plus of course the satellite antenna positioner and the satellite receiver. The new product does not add remote control to existing non-remote packages, but combines the functions of separately controlled units into a single 'master remote' system.

It works this way. The 'Control Center' unit is placed head to head with any IR remote in the house. The GE unit 'learns' from the individual remotes, and as each function is depressed on the original unit, the Control Center microcomputer memorizes the commands. A liquid crystal display helps the user through the selection process for the many units which the IR unit can replace. Range is up to 33 feet and the size is .56" by 1.6" by 3" with a battery loaded weight of .6 pounds. Suggested retail price is under \$150 and TVRO dealers will be able to purchase the unit at 'wholesale pricing' for retailing purposes. For information, call 800/626-2000.



GENERAL ELECTRIC Ends Coffee Table clutter

**Microwave Filter Company** (6743 Kinne St., East Syracuse, NY 13057; 800/448-1666) has a pair of new 'TI' (terrestrial interference) aids for the TVRO dealer. **'Use of Artificial Shielding'** is a book describing techniques for creating barriers to terrestrial interference so that signals do not wander into TVRO feeds and destroy or impair satellite reception. Price is \$19.95 with a \$10 coupon for product discounts included.

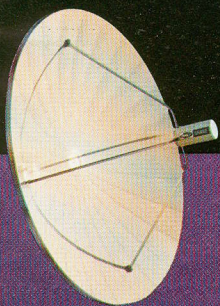
**Microwave route maps** are another new product available on a state-by-state basis. The maps are backed up with a technical data file showing frequency, power and azimuth of each terrestrial transmitter within a state. The maps are \$100 each and the support data books are \$125 each; Texas, Florida and California, because of state size, require two maps and data texts.

**Video Products Technology** (105 Hayward Avenue, San Mateo, Ca. 94401; 415/347-6467) has introduced **'Siteman,'** a TVRO test set. The 25 pound package has a built-in five inch color monitor system and includes features to allow a single man to do site surveys, antenna alignment, LNA testing, downconverter testing, provide receiver functions (with baseband video, audio and RF output), operate the polarization device. The unit comes with a weatherproof carrying bag and a built-in sun screen. It operates from 110 VAC or an internal, chargeable, battery supply (3 hour nominal operation with charge).



SITEMAN Draws Bead On Tests

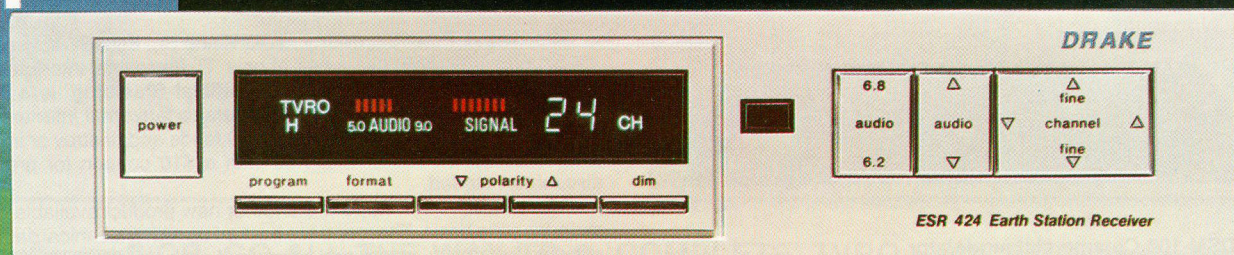




# Double

ESR  
424

## EARTH STATION RECEIVER



The Drake ESR424 Home Satellite TV Receiver gives you the choice you've been waiting for! Now you can choose between economical single conversion or convenient block down conversion. Both models feature state-of-the-art microprocessor design and an infrared remote control. The Drake ESR424 also features audio seeking to take the tedium out of locating your favorite audio channels. We've even added an easy-to-read fluorescent display that tells you everything you need to know at a glance. Any way you look at it, the Drake ESR424 marks the beginning of a new era in satellite TV technology.

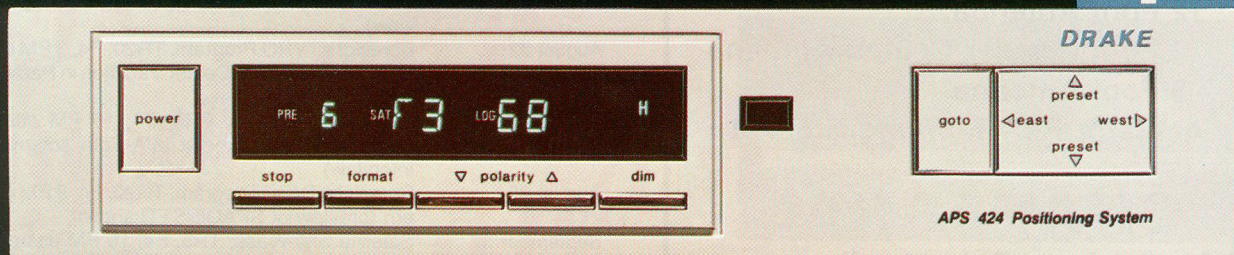
**DRAKE**



# Feature.

## ANTENNA POSITIONING SYSTEM

APS  
424



The Drake APS424 Programmable Antenna Positioning System is a significant leap ahead in antenna control technology. Microprocessor design makes it easy for you to program and select your favorite satellites. A bright fluorescent display shows your choices clearly. With a simple push of a button, the powerful APS424 motor drive will move your antenna to the exact position required. The slender design of the APS424 also complements the Drake ESR424 receiver. Best of all, the same infrared remote control for the ESR424 Receiver also controls the APS424. Satellite TV viewing has never been more convenient!

**DRAKE**

R.L. Drake Company  
540 Richard St., Miamisburg, Ohio 45342, USA  
Phone: (513) 866-2421  
Telex: 288-017

PIONEER MEMBER OF  
**ISPACE**

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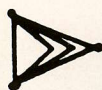


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16 Foot Antenna  
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**PROMAR, INC.**  
4912 W. LaSalle St.  
Tampa, FL 33607

Block and single conversion is accommodated; one year limited warranty.

**Southeastern Satellite Systems, Inc.** (207 Broadway, Asheville, NC 28801; 704/252-1165) offers a **24 hour** turn around for **out-of-warranty** repair on virtually any TVRO product ever built. For a flat rate of \$50, the firm will provide parts, labor and a new one-year warranty for receivers, LNAs and actuators. Payment may be by credit card, check or money order. Any units shipped should include a full description of the apparent problem(s).

(The) **SPACE Dealer Board** plans to offer a new package of commodities to TVRO dealers as further incentive to those dealers to sign up as SPACE 'dealer members' during the Nashville show September 2-4. Books, discounts on video training tapes, slide rules, manuals and guides totaling \$89.85 in dealer value will be included for dealers who sign up during the trade show. Full information in advance from Treasurer Tom Harrington (614/866-4605).

**CALENDAR/ Through September 30th**

- August 15: Boresight TVRO Program, TR20, F4, 9 PM eastern (part two of Doctor Konishi [Uniden] interview).
- August 20: Satellite Showcase, TR5, F4, 10 PM eastern (part two of Bunker at M/A-Com scrambling interview)
- August 22: Boresight TVRO Program, TR20, F4, 9 PM eastern (winner of CSD 'Dealer Vacation in Paradise' announcement)
- August 27: Satellite Showcase, TR5, F4, 10 PM eastern (part three of Bunker at M/A-Com scrambling interview)
- August 29: Boresight TVRO Program, TR20, F4, 9 PM eastern (preview of SPACE/STTI show)
- September 3: Satellite Showcase, TR5, F4, 10 PM eastern
- September 5: Boresight TVRO Program, TR20, F4, 9 PM eastern (first report on SPACE/STTI Nashville show)
- September 10: Satellite Showcase, TR5, F4, 10 PM eastern
- September 12: Boresight TVRO Program, TR20, F4, 9 PM eastern (additional reports on SPACE/STTI Nashville show)
- September 17: Satellite Showcase, TR5, F4, 10 PM eastern
- September 19: Boresight TVRO Program, TR20, F4, 9 PM eastern

**Television/Audio/**

**Note:** A nightly audio-only program, **'FM America,'** broadcast on T303 at 125 west, TR20, 9 PM to midnight eastern features call-in dialogues from members of the TVRO community. Audio is 6.2 MHz and video is a 'billboard' to alert you to the service, up to 11 PM.

**Events/**

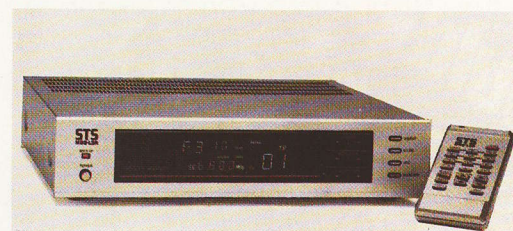
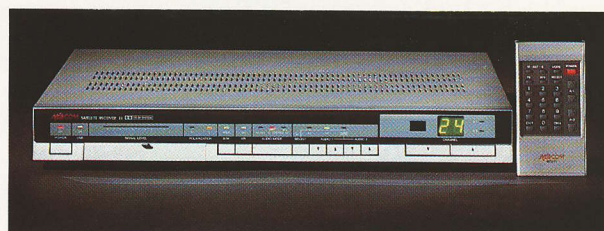
- August 14:** The latest Telstar bird (303) was scheduled to turn on this date from 125 west; AT&T expected the bird to be 2 dB **hotter** at the edges of Conus than the D4 bird (128 west) which it replaced, and 0.5 dB hotter at 'boresight' than Galaxy 1 at boresight. Five full-time and occasional feed video transponders are scheduled including a new sports service.
- August 25-27: Eastern Cable Television Show, Atlanta (Congress World Center); call 404/252-2454 for details.
- September 02-04: SPACE/STTI Earth Station Convention, Nashville** (Opryland Hotel); nearly 700 booths; 12,000 people expected. Registration in advance recommended; call 800/654-9276 for details.
- September 18-20: CABLE/Atlantic Cable Show, Atlantic City, NJ; call 609/848-1000 for details.
- September 25-27: Great Lakes Cable Expo, Indianapolis; call 614/461-4014 for details.



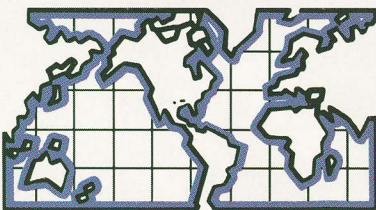


# Success...breeds success!

*Dear Dealer,  
You are family!  
Go and  
Millie*



## SATELLITE EARTH STATIONS EAST INC.



**Satellite Earth Stations East, Inc.**  
P.O. Box 160, Mamou, LA 70554  
(800) 762-2110 U.S. Sales  
(800) 252-3307 LA Sales  
(318) 468-2201 Tech. Assistance  
(318) 468-2203 Local

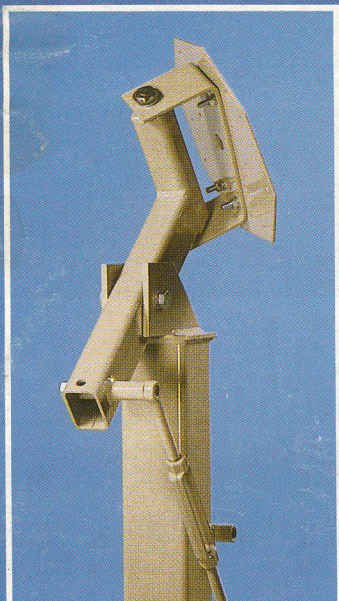
**JóMil Electronics, Inc.**  
Industry Lane, Covington, LA 70433  
(800) 654-9144 U.S. Sales  
(800) 558-0019 LA Sales  
(504) 893-4514 Local

**Satellite Earth Stations of Georgia, Inc.**  
2039 Oglesby Pl., Macon, GA 31206  
(800) 334-9819 U.S. Sales  
(800) 553-1976 Ga. Sales  
(912) 743-9099 Local

**TVRO West, Inc.**  
**d.b.a. Satellite Earth Stations**  
1106 Smith Rd., Ste. 101, Austin, TX 78721  
(800) 325-5043 U.S. Sales  
(800) 252-3457 TX Sales  
(512) 385-0738 Local

**Satellite Earth Stations of Tennessee, Inc.**  
1865 Airline Dr., Ste. 4, Nashville, TN 37210  
(800) 522-8876 U.S. Sales  
(800) 621-8876 TN Sales  
(615) 889-3345 Local





# Higher Performance

Our brand new polar "T" configuration means greater strength and an increase in polar tracking precision.

We've added oil impregnated, centered bronze bearings and we've increased the mount height for full 0° to 90° elevation adjustments.

The net result is a stronger more precise antenna. After all, higher performance is why you buy Paraclipse.



Paraclipse 3.8m (12ft)



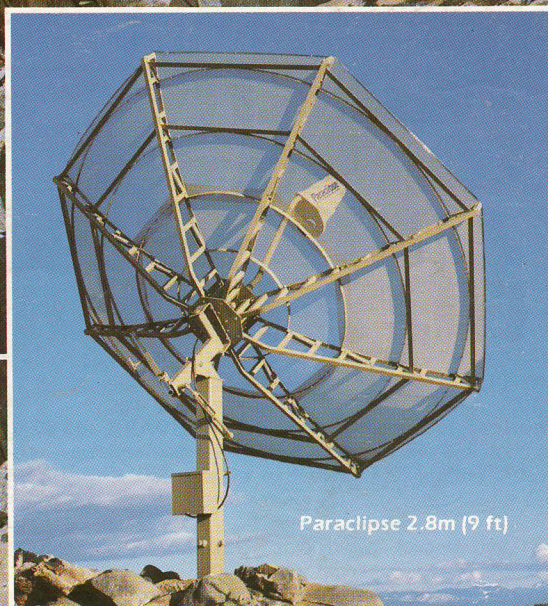
Paraclipse 2.8m (9ft)

PIONEER MEMBER OF  
**DISPACE**

**Paraclipse**  
HIGH PERFORMANCE  
SATELLITE TELEVISION SYSTEM

Paraclipse Inc.  
3711 Meadowview Drive  
Redding, California 96002  
(916) 365-9131

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Paraclipse 2.8m (9ft)

Mark Fator photograph